





## COMPUTER WEEKLY

Vol. 30 No. 741  
Thursday, January 22, 1981Editor  
Simon Timm 01-881 3122Deputy Editor  
Brandon Garmentar 01-881 3124Advertisement Manager  
Harry Hutton 01-881 3101  
01-881 3102Class Ad Manager  
Brian Durrant 01-881 3106Publishing Director  
Dr J. A. B. ThomasEditorial Director  
Chris HipwellPC Electrical Electronics Press Ltd.  
Quadrant House, The Quadrant,  
Bournemouth, Dorset BH2 6BA.  
Telephone: 01204 81875Branch Offices:  
Birmingham: Leven House,  
202 Westside Road, Birmingham B42 1BA.  
Telephone: 0121 359 4338Manchester: Grove House,  
Barton Road, Old Trafford,  
Manchester M16 0PE.  
Telephone: 0161 275 0801New York: 205 East 42nd Street,  
New York NY 10017.  
Tel: (212) 512 2880.Published weekly on Thursday.  
Registered at the Post Office as a  
newspaper. Price 50p copy 35p.

© PC Business Press Ltd 1981.

## EDITORIAL

The following editorial staff can  
be contacted on 01-881 3800,  
with the extensions shown:  
Keith Jones 3835  
Rory Johnston 3834  
Kevin Cahill 3838  
Claire Gooding 3841  
Eileen Stainer 3840  
Paul Fisher 3838  
Donald Kennett 3838  
Mike Marples 3846  
Nancy Poole 3845  
John Earl 3843  
Julia Cottrell 3844

## ADVERTISING - Display

The following staff can be  
contacted on 01-881 3800, with  
the extensions shown:  
Chris Pinar 8804  
Ken Welford 8872  
Ian Carter 8871  
Xenia White 8870  
Steve Sans 8870  
David Hogan 8874Manchester: 061-872 8861  
Birmingham: 021-358 4838  
Keele: 021-358 4838

## ADVERTISING - Classified

The following staff can be  
contacted on 01-881 0121:  
Chris Pinar 8804  
Ken Welford 8872  
Ian Carter 8871  
Xenia White 8870  
Steve Sans 8870  
David Hogan 8874

## ADVERTISING - Production

The following staff can be  
contacted on 01-881 3800, with  
the extensions shown:  
Steve Lever 3104  
Peter Ruge 3876

## Computer Weekly has a situation

each week of over 80,000, including  
the highest fully registered circulation  
in the UK.

## Computer Weekly is a national

weekly, with the following  
features: a full range of news,  
company profiles, computer  
advertisements, management  
advertisements, and a full  
range of classified advertising.

## Computer Weekly is a national

weekly, with the following  
features: a full range of news,  
company profiles, computer  
advertisements, management  
advertisements, and a full  
range of classified advertising.

## Computer Weekly is a national

weekly, with the following  
features: a full range of news,  
company profiles, computer  
advertisements, management  
advertisements, and a full  
range of classified advertising.

## Computer Weekly is a national

weekly, with the following  
features: a full range of news,  
company profiles, computer  
advertisements, management  
advertisements, and a full  
range of classified advertising.

## Computer Weekly is a national

weekly, with the following  
features: a full range of news,  
company profiles, computer  
advertisements, management  
advertisements, and a full  
range of classified advertising.

## COMPUTERVIEW

## Japanese U-turn

WITH the announcement that yet another Japanese company is to launch its personal/business computer on the UK and European market, it seems the Japanese are keeping to their proven rule - persistence pays in the end. Despite opposition from national governments, Japanese exports of personal computers into EEC countries have risen from almost zero to 1,000 units a month in the last year.

Now, after constant denials that the PC-8000 would be introduced to the European market, Nippon Electric has done a U-turn and plans to launch a personal computer system based on the PC-8000 in the UK and Europe at the end of this year.

The PC-8000 was revealed to visitors to last year's Compec. Over 300 inquiries came from dealers, distributors and visitors, according to NEC, and this is the factor that persuaded the company to alter its plans.

Already, three other relatively small Japanese companies have become exporters to Europe in the personal computer field. They are Sord Computer Systems, AI Electronics and Logic Systems International, all based in Tokyo. Intentions of all three are to become exporters to the US early this year, initially in small quantities. However, they expect sales to increase rapidly as they have done in Europe.

One factor that must be causing a great deal of anguish to Japanese manufacturers is

import restrictions. The quality and reliability of Japanese products make them very competitive, and the inevitable reaction of European countries is to impose restrictions, as France is threatening to do. France has already warned the Japanese government (mentioning Sord Computer Systems in particular) to restrain its exports.

But the Japanese persist. One good way of overcoming import restrictions is to set up an assembly plant in an EEC country, and Sord has done just that.

Assembly of its microcomputer systems has begun at a small factory in Dublin. The units are shipped in the UK through two distributors, Edleigh Business Machines of Penzance and Midas Computers. According to Sord most of the assembled units from Dublin go into France, to two major customers, the French Ministry of Defence and the French National Bank. (No wonder France wants to impose restrictions!)

Which other Japanese companies will follow Sord? NEC could easily, as it already plans a UK semiconductor plant. Only four months ago it was announced that NEC was planning a 64K RAM and 16-bit microcomputer plant at a site in Livingston, near Edinburgh. It will operate under the name of NEC Semiconductor UK and be fully operational by 1982.

Even more ironic is that Livingston is a "special development area" and NEC will receive financial assistance from our government. In a way the UK, far from strengthening its indigenous personal computer manufacturing industry, is financially assisting a Japanese company to take a part share in the market.

## Viewdata move

A WELL OVERDUE move for members of the emerging viewdata and teletext industries to work together got under way last week at a conference organised by the Department of Industry.

The next stage is to get those members, whose previous marketing efforts were described by Information Technology Minister Kenneth Baker as being unco-ordinated, to agree on a common strategy, despite the fact that many of them are rivals.

Last year the DoI brought the teletext industry together in an awareness campaign which started with 15% of adult consumers knowing about teletext and reputedly finished with 50% knowing. At the same time, sales of teletext sets reached 120,000.

This year the field has been broadened to include viewdata, which has already had a big push from British Telecom and is beginning to enjoy success in small specialised markets, as well as continuing sales overseas.

With any luck the field will quickly be broadened further to bring together other aspects of information technology. Perhaps cable television and two-way radio will be seen to be related - after all, they are an important part of the US market and a major target for UK-based viewdata and teletext industries.

And since the export success of these industries is expected to benefit the development of the home market, perhaps it will be possible to persuade British Telecom to allow Prestel terminals to access Packet Switched Service, communications each other symmetrically at a variety of speeds, call each other and answer automatically, attach to computers and other devices and link to radiophones or a multi-function terminal.

The Telecommunications Council is going to create a forum for interests such as computer, mobile radio and telecommunications companies and their users may still succeed.

Other focal points for hopeful users are: The DoI's Information Technology Unit and its enthusiastic new British Telecom's telematics division; Hmo-Office's working party on such; and Professor Beesley's report to the Secretary, due shortly, on the liberalisation of British Telecom's monopoly.

But when will these combined efforts be able to bring us Space Invaders on View? Will the viewdata industry see any role in the International Standards Organisation's work on Open Systems Interconnection; the ability to connect anything to anything; and the focus of attention moved on from the rich pickings of terminal equipment market to the mass market for services to which cheap multiple terminals can provide widespread access?

LETTERS to the EDITOR  
Separating information from raw data

I SEE from the articles by Messrs Michie and Sutcliffe (CW, January 8) that there is still no shortage of gentlemen to discuss earnestly problems of the "number-of-angles-that-can-dance-on-the-head-of-a-needle" type.

As a new reader, I have not had the pleasure of seeing Professor Michie's definition of "information" but from their discussions it would appear that they are using "information" in its technical sense.

While this is fine for Shannon's Information Theory and for work involving thermodynamics, it is not so useful for managers concerned with everyday decision-making.

In its managerial sense, "information" is what we need to make decisions.

With an information we are guessing, with incomplete information (the most common state of affairs) we hope to do better than guessing and perfect information hardly ever arises in real management situations.

In these circumstances, a better definition of information is given by Beer as "That which changes us" i.e. causes us to behave/decide differently from how we would have behaved/decided without that specific input.

The key is that information is managerially useful.

How does information in the managerial sense relate to information in the technical sense?

The manager's everyday environment, which is a part of Professor Michie's open system, is a sea of technical/thermodynamic-type "information". This may be considered to be "latent data" in managerial terms.

As a matter of routine, request or chance, someone does out into the environment and collects some of this latent data. It then becomes "raw data".

Someone may recognise and extract meaning out of the raw

data and it becomes information in the managerial sense.

We only really know that information has been received if someone did change his or her actual state (and possibly other people's as well) as a result.

Thus, information is only information if it is used. Information I cannot use is not information, it is, to put it politely, just data.

This does not mean that it may not be information to someone else. How often do managers bemoan the fact that some vital piece of information never reached them because someone else did not think it important?

The information that Michie and Sutcliffe are discussing is only a precursor of the information the manager uses. How relevant are their discussions to computers and managerial "information"?

The key step from raw data to managerial information depends upon two things:

Its ability to fulfil someone's needs; and ability to extract and recognise what is useful/relevant.

Computers can certainly be used to assist in the collection of raw data out of latent data; and even to collect it where it was not possible previously.

They can certainly be used to

assist in the extraction of information out of raw data.

Computers cannot by themselves recognise what is useful, nor can they by themselves define needs. Only people can do that.

The number of people in the world is limited, as is their individual ability to extract information out of data.

If computers can be used to extend our ability to extract useful information and hence perceive meaning in our surroundings, that should be sufficient to qualify them as useful.

Whether or not computers can ever have infinite capacity has no real relevance to their usefulness to a finite population of people.

Furthermore, prolonged discussion about whether the computer creates or merely assists the collection of information is irrelevant to the person who needs the information.

If my comments achieve no other result, they will no doubt provide Messrs Michie and Sutcliffe with something to agree about.

D. C. SUTTON  
Management Analyst  
System Six,  
Gatley,  
Cheshire.

## 1984 and all that . . .

THIS week's example of the strange things people say in the media about computers was set in by David Howe of Ashby-de-la-Zouch, who wins £5.

The computer keyboard operator taps out the story and in doing so sends electronic impulses to be registered on cassettes, called "Data".

Coalville and Ashby Times

NHS COMPUTER REQUIREMENTS  
PRESCRIPTION PRICING AUTHORITY  
NEWCASTLE-UPON-TYNE

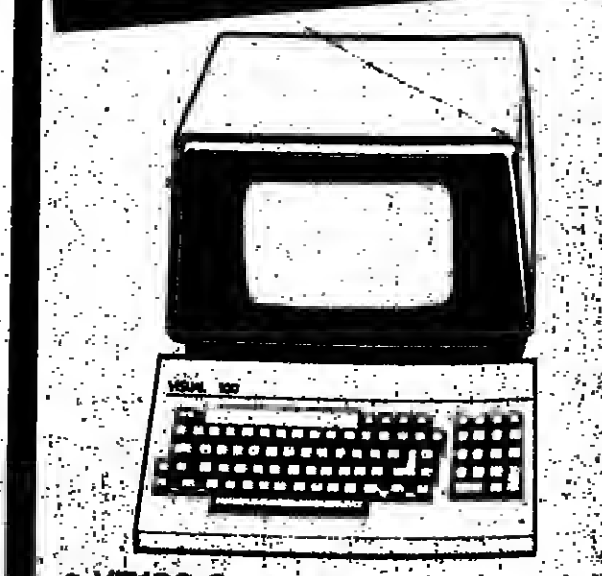
A 180 keypoint P.C. system is required to capture 3 million prescriptions per month in the first of the Authority's 13 processing divisions, commencing by July 1982.

Detailed Operational requirement available from:  
Computing Services Office, Prescription Pricing Authority, Bridge House, 162 North Street, Newcastle-upon-Tyne, NE1 1SH

TEN YEARS AGO  
From Computer Weekly of January 21, 1971

A REVEALING picture of how Whitehall and Westminster employ computers and envisage their future emerges from the long-awaited Civil Service Department report, Computers in Central Government Ten Years Ahead, which shows the Ministry of Defence leading the list of present users. Looking to the future, the report foresees cumulative hardware investment of £200 million by 1980 with govern-

ment computer power some 20-fold over the period. British Rail Scotland has another £300,000 MARCONI train description system. AEI-General Signal Ltd look for Central to complement earlier installation at Mole. . . . Some 85% of computer did not provide specific hardware purchase, a fact contained in a recent Nippon Computer Centre survey.

Wilkes Computing  
Announce the  
VISUAL 100

- VT100 Compatible
- Advanced video option is standard
- Current loop interface is standard
- Buffered printer interface option only £34
- One off end user price only £850
- OEM discounts available

Wilkes Computing  
Tel (0272) 25921 Telex 449205



An online terminal in a branch of the Trustee Savings Bank.

## Towards bank automation

BIFU, the banking and insurance trade union, has produced a booklet describing microelectronics in the bank in an effort to encourage banks in the UK to become fully automated.

Entitled Microtechnology: A Programme for Action, the document includes a model agreement on new technology, model guidelines for the operation of VDUs and a new technology assessment form.

It emphasises the need for proper implementation of new technology to avoid further economic depres-

sion and unemployment. By 1990 there will be a 5% reduction in the number of bank branches and a 10% reduction in bank staff throughout Europe, BIFU says.

It has been predicted before, says BIFU, that the number of front office workstations in bank branches in Europe will more than double during the next five years. Some 22% of customer contact positions in European banks are now automated, and this number is expected to rise by 44% by 1985 and over 60% by 1990.

## Analysis of the first member of H-series

AN analysis of the IBM 3081, generally accepted as the first member of the long-awaited H-series, will be included in a two-day conference in London on February 16/17 organised by the Yankee Group.

With the title, Evolving the IBM Network, the event will also feature a talk about new aspects of IBM's Systems Network Architecture.

Other topics will cover areas such as IBM's directions in telecommunications and office technology, and its strategies for operating systems and databases.

Discussion of the 3081 will consider if the machine will be made obsolete in two or three years' time by new H-series computers capable of supporting future versions of systems software like MVS, VM, VSAM and IMS.

To be staged at the Cumberland Hotel in London, the conference will be the latest in the Yankee Group's European Technology Update series. It will be led by two well-known IBM watchers, the Yankee Group's own director of market research, Dalo Kutnick, and Dr Dixon Doli who is retained by IBM as a training consultant despite his public pronouncements and predictions about IBM's strategy.

Further information about the event can be obtained from either Al Dunn or Gwendolyn Thompson, CTS, The Yankee Group, Regal House, Lower Road, Chorleywood, Rickmansworth, Herts, WD3 5LQ. Tel: Chorleywood (09278) 4714.

## Timeplex sues Racal

US DATA communications manufacturer Timeplex has started legal proceedings against its former exclusive European distributor Racal-Milgo (CW, October 23, 1980), alleging misuse of trade secrets and breaches of various agreements.

In preparation for arbitration in New York City, Timeplex - which set up a UK subsidiary early last year - has asked for court authority to question Racal employees under oath and to examine company records.

## IBM profits up to \$3.5bn

From front page  
million loan in the Eurodollar market.

IBM has traditionally been a net generator of its own funds and, taken with the surprise billion dollar 1979 borrowings, the current loan takes the company into more conventional external loan funding.

The current loan is on behalf of the IBM World Trade Corp. overseas unit. The interest rate on the seven-year loan, unconfirmed by IBM, is said to be 12.5%, a very favourable level to Eurodollar borrowers.

## CAP chief quits for Microsoft

From front page  
put all his eggs in the Micropro-

ducts basket. It has been very much his "baby" since its beginning in 1976, when CAP's backroom genius, Richard Hart, programmed a Motorola 6800 linked to Digital Equipment PDP-11, giving rise to the whole idea of portable software. Since then CAP has absorbed most of the software's considerable energy and enthusiasm.

Microsoft's main triumph is its portability, has worked against it in the marketplace. MicroCobol achieves portability (even to the degree of using the same discs on unrelated machines) by taking its operating system, BOS, along with it.

But though the user can swap software between microcomputers, none else supports BOS, and so is limited to CAP Microsoft's range of products if he wants off-the-shelf business software.

## Shipowner replaces BOC as backer of ICL-based bureau

AS backer for the ICL based bureau Systemsolve, BOC has been replaced by Hunting Gibson, a £12 million publicly quoted company in the shipping and broking business.

Hunting Gibson has bought BOC's 40% holding in Systemsolve and has taken a 50.1% controlling interest by acquiring some other Systemsolve shares. Total value of the deal was just over £1 million.

Hunting Gibson has no previous experience of the computer industry and its company secretary, John Smith, said that all decisions would be left in the hands of its existing bosses. But Smith will sit on the Systemsolve board.

Systemsolve managing director John Stanley said that BOC was no longer making new financial investments in his company and that it was apparent BOC had no place for Systemsolve in its medium to long-term strategy.

This view was supported by remarks from Colin Southgate, chief executive of BOC Data Services, who said that BOC was not interested in Systemsolve's activities as a hatch bureau and was not happy about holding only a minority interest in the company. He said that BOC had made "a substantial capital gain" from the sale of its shares to Hunting Gibson.

Last year the BOC Data Service bureau disposed of its own ICL 2972-based service to concentrate on IBM-oriented operations. Systemsolve's bureau, located near the BOC Data Service centre at Sunbury-on-Thames, operates two ICL machines, a 2903 and a 2905. Turnkey systems provide a high proportion of the company's revenues, with ME29 work becoming increasingly important. Software packages for ICL machines are another major area of activity.

Systemsolve's turnover is expected to grow from £2.45 million in its financial year ended September 30, 1980, to £3 million in the current year.

Hunting Gibson chalked up a pre-tax profit of £1.5 million on a

£6 million turnover in the first six months of 1980 compared with £2.9 million on £12.4 million in 1979.

Hunting Gibson is one of three separate publicly quoted Hunting companies with engineering interests and historical connections.

BOC's interests in the computer services business are among the biggest in Europe. Apart from BOC Data Service it owns Software Sciences and the personnel company Knight Computer Services.

## Electron beams supplant heat

A BRITISH company, Lintech Instruments of Cambridge, has developed electron beam equipment for use in the manufacture of semiconductor devices much faster than the present thermal techniques. The electron-beam annealer, called Sema in its production form, will have a throughput of 200 wafers per hour for ion-implanted semiconductor materials.

FAST  
FROM  
SYSTEMEK

## SYSPAK/70

A POWERFUL DEC™ BASED RANGE OF SYSTEMS DELIVERED AND INSTALLED COMPLETE, NEW AND FAST

ALL PACKAGES INCLUDE THIS BASIC HARDWARE AND SERVICES

11/70 CPU, 512KB, LA120™  
TS11-B 1600BPI MAGTAPE™  
DISC CONTROLLER  
16 LINE MULTIPLEXER  
10 x VT100™ COMPATIBLE VDUs  
600 LPM BAND PRINTER  
8 DISC PACKS  
OPERATING SYSTEM + SYSGEN  
DELIVERY + INSTALLATION\*

SYSPAK/70-M1

2 x 67 MB DISC DRIVES  
RSX-11M OPERATING SYSTEM

£94,000

SYSPAK/70-M2

2 x 256 MB DISC DRIVES  
RSX-11M OPERATING SYSTEM

£100,000

SYSPAK/70-E1

2 x 67 MB DISC DRIVES  
RSTS/E OPERATING SYSTEM

£97,500

SYSPAK/70-E2

2 x 256 MB DISC DRIVES  
RSTS/E OPERATING SYSTEM

£103,500

ALL PLUS VAT

Complemented by full h/w maintenance and software support and applications including order processing, word processing, sales/purchase/nominal ledger, payroll, stock control, and much more

WATCH FOR SYSPAK/34 /44 /750 /780 OR CALL NOW

SYSTEMEK NORTH FINCHLEY  
LONDON N12 0AZ  
LTD

01-349 2911/4

01-349 9267/8

TELEX 8952836

\*Delivery and installation  
from UK & Eire only

Registered trademarks of  
Digital Equipment Co. Ltd.

Offered subject to  
continued availability

OR LEASE AT HIGHLY  
ATTRACTIVE RATES



## Downtime

by Chad

MANY of us have an addiction to using technical or scientific language when talking about everyday things. It can be extremely useful.

For example, I have been sitting in restaurants with colleagues, and as the waitress turned away said, "And a plate of chips." This elicited no visible response, and we would wait breathlessly to see whether the chips arrived.

One of us would ask, "Do we have a data entry failure?" to which the reply would be, "Seems to have been a breakdown in the handshake routine."

# A language of our own

Of course the problem with this language is that you cannot use it with outsiders, but I often wish you could.

For example, I am baffled by the jams one gets in tube trains during the rush hour. People can be squashed like steam-rolled sardines near the doors, while others are standing obliviously in the middle of the cars with plenty of space around them, reading their newspapers.

There seems to be enormous friction on the movement of people, even under severe pressure gradients. The people half way in between have plenty of newtons shoving them from

one side but still they do not move. Bellows of "Move down inside!" have little effect, and I fear that explaining about the

pressure gradients would have less. Just pushing elicits nothing but indignation.

Another yawning gap in the scientific awareness taught (or

rather not taught) in our schools. Or perhaps it's just good old British bloody-mindedness, which I gather has had a preservation order slapped on it.

## Quibblers of the DP world unite!

SOME anonymous person at Hull College of Higher Education (are they basically self-effacing in Hull?) has sent me a cutting from our sister journal Systems International about a new Harris mini.

Says the story, "Included in the price of the 24 bit system is 6 M-byte of virtual memory, a

Winchester disc and mag tape drive."

The nameless Northern comments: "Payable in Monopoly money, presumably."

Personally I find rather fascinating the idea of having to pay money for memory which isn't there.

The reaction of my colleagues

on Systems was, naturally enough, "Snip quibbling, you know what we meant!" But we computer people are the world's ace quibblers, are we not?

What with virtual machines and virtual terminals, I have heard more than one data processing manager wish that he had virtual users.

## FOCUS

### Turning on to Prestel

HIGH on the 1981 computer installation list is the matter of getting to the videotext principles.

Given a choice of level EFT and PDS network, line voice response systems, videotext, the PDS channel would come in a starting grid.

Somehow along the telephone lines, the heralded wonder of the nation age, Prestel videotext is to be in disconcerting mode.

Dr Adrian Stokes, sales book, Videotext, a PDS information Utility, that has been around for a while time without appearing off the ground and has no communication channels.

The first feasibility study introduced by the PDS in 1972, an in-house demo staged in 1973, and a pilot trial in 1975 and pilot trials began.

### Pushing

This trial was followed by a variety in 1977 and vice a year later.

Had such times as data processing, the was just about to get the 360 model.

The rest of the world has been alighting on the common sidelines. While Prestel is development and staffing and loses the support of users like Curry's and many, the French Telecom Canadian Telidon system pushing hard.

The Irrepressible Prestel hoping to set the pace, plan to issue CRT keyboards to all domestic subscribers free of charge.

Similarly, in the United States, the "challenge of videotext" appears more as a threat.

With the multiplicity of cable and telephone networks, the absence of a postal network are already several years in information service in the US.

### Misfortune

As might be expected, systems are designed in the to go far beyond that of "electronic yellow pages" EFT, home banking, mail-box services are all in the home information services.

One area where the UK lead is that of expertise. The videotext progress is equally between British TV manufacturers, users and customers.

Prestel suffers the misfortune of being the and as such as had to share off bad luck.

The latest directional seems to be moving away from the domestic market and towards business users. Strangely, CUGS (Closed User Group) being urged to take advantage of the nationwide Prestel service.

## Solartron wins £31.2m Drax contracts

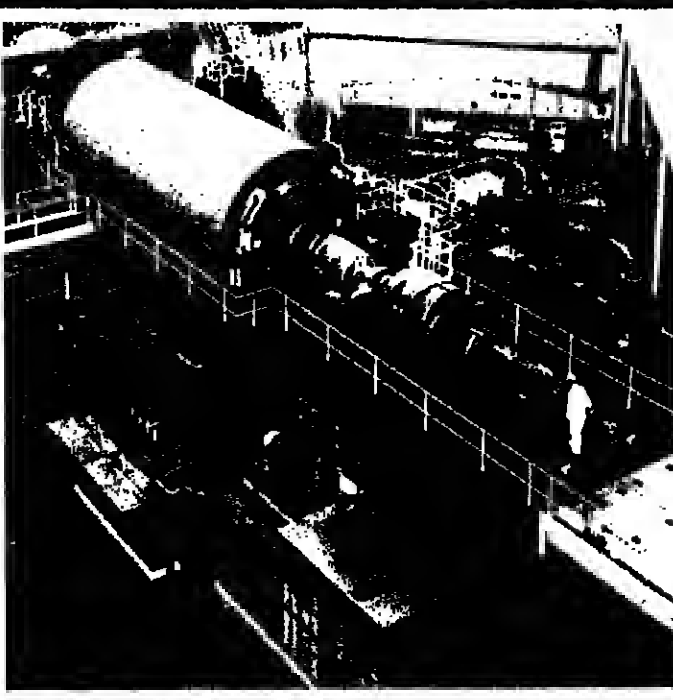
TWO major contracts announced earlier this month for data processing systems at the giant coal-fired Drax power station in Yorkshire, have brought more than £31.2m worth of business to the Hampshire-based Industrial Systems Division of Solartron Electronic Group.

The company has been appointed main contractor for the design and installation of monitoring and control equipment for the three 660MW steam-turbine generators and associated equipment which constitute the final phase of this Selby coal station.

Over 3,000 analogue inputs and 7,000 status/event inputs will be monitored by the system. Hardware includes seven supervisory computer systems, DEC PDP 11/44s, and 21 intelligent data centres linked with associated peripherals to form a distributed network which uses the high speed data communications protocol, HDLC.

The larger of the two contracts was for £2.8m and covers computer-based systems for the collection of operating data from the boilers, turbines and common services, for presentation in the form of displays and printouts to the operators in the control room.

The other contract, for £900,000, was for a similar but smaller system to monitor status and event inputs at the Drax substation, where the power station output will be transferred to



One of the three 660MW turbine-generators installed at the CEBG's coal-fired Drax power station near Selby, Yorkshire. Solartron will provide the data processing systems for three similar turbines at Drax.

the Grid. The two data processing systems will also communicate with each other.

A large number of the plant monitoring units were manufactured by Solartron and include a microprocessor, which enables them not only to detect plant contact changes but also to provide an accurate record of the time at which the event occurred.

The award of the contracts represents an important milestone for Solartron as the company will now be main contractor to the Central Electricity Generating Board Generation Development and Construction Division.

## Storage Tech picks up Amdahl staff in IBM moves

PURSuing its plans to move into the big IBM-compatible processor business (CW, November 6, 1980) Storage Technology has set up the company that will handle development work. Called STC Computer Research Corp, it is based at Sunnyvale, California, and already has picked up several key personnel from nearby Amdahl.

Storage hopes to stand by its plan to finance the development company largely from outside sources on a partnership basis in order to avoid any adverse effect

on its own profitability. It sees \$50 million being needed to develop a marketable family of machines to match the IBM H-series. Power ratings will start at seven million instructions per second.

The development team at STC Computer Research is expected to reach 160 people by the end of 1981 and should have completed its work on the first machines by early 1984. Storage will then have the right to buy the technology from the Sunnyvale organization along with exclusive manufacturing and marketing rights.

## Brunei Management Programme London School of Economics

### SUCCESSFUL SYSTEMS DESIGN

The Human Element 18-19 March 1981

A course for systems designers who want to introduce changes which contribute to the organisation's effectiveness. Fee: £300

Further details from Angela Crawley Uxbridge (0895) 55461

### IMMEDIATE DELIVERY!!

DEC VT100 DECSCOPES £850 + V.A.T.

CONQUEST COMPUTER SALES LTD

92 LONDON ROAD BENFLEET ESSEX SS9 5TJ

SOUTH BENFLEET 03746 59861 TELE: 956461 CONGRP 8

# Data 100 parent axed in US merger

TROUBLED Northern Telecom Systems Corp, the organisation set up to take over the operations of Data 100 in 1978, no longer exists as an independent organisation. Its Canadian parent, Northern Telecom Ltd, has merged it with an older US subsidiary, Northern Telecom Inc of Nashville, Tennessee, in which it will operate as a division called Electronic Office Systems.

At the same time Data 100 has confirmed that the factory at Cork in Ireland that builds its 7X range of remote batch terminals and key-disc systems, is to be run down by the end of March. Well over 100 people will lose their jobs in

addition to more than 70 at Data 100's Hemel Hempstead plant.

A total of 300 staff are being shed in Europe as part of the upheavals within the former NTSC that have forced the Canadian parent to write \$220 million off its accounts for 1980.

Manufacturing of Data 100 originated kit will now be confined to the US because most of the firm's new business is generated by the 4XX series of distributed processing systems developed originally by Sycon. This is the other US-based terminal equipment manufacturer that Northern Telecom took over about three years ago. Sycon's merger with

Data 100 under the NTSC banner was a major cause of the trouble at NTSC.

The 4XX series is expected to be enhanced very shortly with word processing facilities.

**Imbalance in semis** EUROPE'S semiconductor output for 1979 was worth \$1.3 billion, although it used about \$3 billion worth, according to the latest report from Dataquest, a market research company in the US. A similar imbalance existed for integrated circuits: European manufacturers produced \$500 million worth, while users bought around \$1.6 billion worth.

## MICHIE'S PRIVATEVIEW

# Martian information structures considered harmful

LAST Privateview left the question: what is an information structure? Also, can you create one without creating information?

The decision tree of Figure 1 answers questions about the complete set of legal king-pawn positions in which Black is to move. When processed by machine or interpreted by hand it will deliver for any such position the information whether the lone king is lost or can draw. After allowing for symmetry, there are 97,992 legal KPK positions with Black to move. Of these, 61,787 are lost and 36,205 are drawn. Viewing the decision-tree as an information source, we apply standard theory to credit it with 91,887 bits of information with respect to the LOST versus DRAWN classification. The tree-Interpreter need be no more than the code for interpreting ordinary conditional expressions. Also needed are mechanisms for evaluating the six attributes corresponding to nodes. These take the form of "subroutine trees" of the main tree.

Figure 2 portrays an algorithm which computes exactly the same result. It performs exhaustive lookahead and hence is only time feasible for positions lying near the

end of the game. So only some of the 91,887 bits' worth of information implicit in it is immediately realisable. Like the object information structure, it too is an object that algorithmic forms constitute a race apart, not to be lumped with trees, nets, strings and other structures found in the lowly world of data. These people have been brain-washed by computer languages which build this distinction into their design. Other languages such as LISP and POP-2 ride over it, and in Figure 2 the lookahead algorithm has deliberately been dressed up as a data-structure.

### Equivalent

Another information structure is the complete machine tabulation programmed by Michael Clarke for king-pawn-king, from which the same answers to the same questions are retrievable by lookup. With respect to the possibility of Black's drawing this lookup table contains exactly the same amount of information as each of the others.

Do mechanisable procedures ex-

ist for transforming one informationally equivalent structure into another? Figure 1 with its supporting sub-trees was synthesised semi-automatically by Niblett and Shapiro using the Hunt-Quinlan induction procedure ID3. Their program iteratively sampled Clarke's database and selected from it tutorially powerful examples for self-administration. The result, as can partially be verified from Figure 1, makes excellent sense to the chess expert. Hence it would be legitimate to speak of its contained information as constituting "knowledge", since it possesses the human-friendly aspect that we recognise by that name. Although ID3 has not created information, but simply recast what was already in the lookup table, new knowledge has undoubtedly been mined from Clarke's previously excavated nugget of raw information.

In a second run the experimenters withheld human guidance, so that ID3 was obliged to construct a complete single-level tree from its own resources. As a source of full and accurate information the resulting decision tree was at least equally machine-efficient. But to the chess expert it was gobblede-

gook and might as well have been made on Mars.

In laboratory experiments at least, the machine learning problem is on the run. In consequence the following question acquires urgency. Much as it might delight certain well-meaning physicians, should we be happy to see the robotics scene flooded with information structures of Martian colour? Or is there a necessary place for artificial intelligence specialists, who engineer such structures to lie within the "human window"?

### Transparent

Machine acquisition of classificatory strategies is critically relevant to robot vision, robot action-planning, assembly sequencing and industrial scheduling. New and sharper variations arise of old issues. When, for example, does a given requirement call for the numerical and combinatorial approaches of classical control engineering and operations research? When should methods be tuned to the user's need for transparency? To some the path from



Professor Donald Michie is head of the Machine Intelligence Research Unit at Edinburgh University.

laboratory analysis of chess to advanced robotics seems obscure. To me it has always seemed short and straight.

### References

1. Clarke, M.R.D. (1977) A quantitative study of king and pawn against king. In Advances in Computer Chess (ed. M.R.D. Clarke). Edinburgh: Edinburgh University Press. Only LOST-DRAWN information from the table is relevant here.
2. Niblett, T. and Shapiro, A. (1981) Automatic induction of classification rules for a chess endgame. Paper to be delivered to 3rd International Conference on Advances in Computer Chess, London, 9-10 April.
3. Lighthill, J. (1973) Artificial Intelligence: a general survey. In Artificial Intelligence: a Paper Symposium. London: Science Research Council.

BROAD MEANING OF ATTRIBUTE	
LOST	can't be a specific pattern which entails that however Black moves White can promote the pawn without moving his king.
LOST	means entails that the pattern entails either holds or is achievable.
LOST	The pawn is a rook-pawn and can't be achieved.
LOST	The pawn is on rank 6 or 8 and the pattern entails either holds or is achievable.
LOST	The pawn is on rank 7 and the white king can force its way next to it.
LOST	Mutual interference operates between blockability of pawn and king.

Equivalent conditional expression for evaluating input position is:  $(\text{rank}(\text{pawn}) = 6 \vee \text{rank}(\text{pawn}) = 8) \wedge (\text{king}(\text{white}) \neq \text{king}(\text{black}) \vee \text{rank}(\text{king}(\text{white})) = 7) \rightarrow \text{LOST}$  (see ref. 2).

Figure 1. Program-generated decision tree for king-pawn-king positions with Black to move. LOST and DRAWN. For each of the six attributes a similar tree was generated by the program from a set of more primitive attributes (see ref. 2).

DIGITAL • ANDERSON JACOBSON • TRANSDATA • AM JACQUARD • MELLORDATA • NEWBURY LABORATORIES • TEXAS

**KSR**

1000s from £14.95 monthly

2000s from £19.95 monthly

4000s from £24.95 monthly

6000s from £29.95 monthly

8000s from £34.95 monthly

10000s from £39.95 monthly

12000s from £44.95 monthly

14000s from £49.95 monthly

16000s from £54.95 monthly

18000s from £59.95 monthly

20000s from £64.95 monthly

22000s from £69.95 monthly

24000s from £74.95 monthly

26000s from £79.95 monthly

28000s from £84.95 monthly

30000s from £89.95 monthly

32000s from £94.95 monthly

34000s from £99.95 monthly

36000s from £104.95 monthly

38000s from £109.95 monthly

40000s from £114.95 monthly

42000s from £119.95 monthly

44000s from £124.95 monthly

46000s from £129.95 monthly

48000s from £134.95 monthly

50000s from £139.95 monthly

52000s from £144.95 monthly

54000s from £149.95 monthly

56000s from £154.95 monthly

58000s from £159.95 monthly

60000s from £164.95 monthly

62000s from £169.95 monthly

64000s from £174.95 monthly

66000s from £179.95 monthly

68000s from £184.95 monthly

70000s from £189.95 monthly

72000s from £194.95 monthly

74000s from £199.95 monthly

76000s from £204.95 monthly

78000s from £209.95 monthly

80000s from £214.95 monthly

82000s from £219.95 monthly

84000s from £224.95 monthly

86000s from £229.95 monthly

88000s from £234.95 monthly

90000s from £239.95 monthly

92000s from £244.95 monthly

94000s from £249.95 monthly

96000s from £254.95 monthly

98000s from £259.95 monthly

100000s from £264.95 monthly

102000s from £269.95 monthly

104000s from £274.95 monthly

106000s from £279.95 monthly

108000s from £284.95 monthly

110000s from £289.95 monthly

112000s from £294.95 monthly

114000s from £299.95 monthly

116000s from £304.95 monthly

118000s from £309.95 monthly

120000s from £314.95 monthly

122000s from £319.95 monthly

124000s from £324.95 monthly

126000s from £329.95 monthly

128000s from £334.95 monthly

130000s from £339.95 monthly

132000s from £344.95 monthly

134000s from £349.95 monthly

136000s from £354.95 monthly

138000s from £359.95 monthly

140000s from £364.95 monthly

142000s from £369.95 monthly

144000s from £374.95 monthly

146000s from £379.95 monthly

148000s from £384.95 monthly

150000s from £389.95 monthly

152000s from £394.95 monthly

154000s from £399.95 monthly

156000s from £404.95 monthly

158000s from £409.95 monthly

160000s from £414.95 monthly

162000s from £419.95 monthly

164000s from £424.95 monthly

166000s from £429.95 monthly

168000s from £434.95 monthly

170000s from £439.95 monthly

172000s from £444.95 monthly

174000s from £449.95 monthly

176000s from £454.95 monthly

178000s from £459.95 monthly

180000s from £464.95 monthly

182000s from £469.95 monthly

184000s from £474.95 monthly

186000s from £479.95 monthly

188000s from £484.95 monthly

190000s from £489.95 monthly

192000s from £494.95 monthly

194000s from £499.95 monthly

196000s from £504.95 monthly

198000s from £509.95 monthly

200000s from £514.95 monthly

202000s from £519.95 monthly

204000s from £524.95 monthly

206000s from £529.95 monthly

208000s from £534.95 monthly

210000s from £539.95 monthly

212000s from £544.95 monthly

214000s from £549.95 monthly

216000s from £554.95 monthly

218000s from £559.95 monthly

220000s from £564.95 monthly

222000s from £569.95 monthly

224000s from £574.95 monthly

226000s from £579.95 monthly

228000s from £584.95 monthly

230000s from £589.95 monthly

232000s from £594.95 monthly

234000s from £599.95 monthly

236000s from £604.95 monthly

238000s from £609.95 monthly

240000s from £614.95 monthly

242000s from £619.95 monthly

244000s from £624.95 monthly

246000s from £629.95 monthly

248000s from £634.95 monthly

250000s from £639.95 monthly

252000s from £644.95 monthly

254000s from £649.95 monthly

256000s from £654.95 monthly

258000s from £659.95 monthly

260000s from £664.95 monthly

262000s from £669.95 monthly

264000s from £674.95 monthly

266000s from £679.95 monthly

268000s from £684.95 monthly

270000s from £689.95 monthly

272000s from £694.95 monthly

274000s from £699.95 monthly

276000s from £704.95 monthly

278000s from £709.95 monthly

280000s from £714.95 monthly

282000s from £719.95 monthly

284000s from £724.95 monthly

286000s from £729.95 monthly

288000s from £734.95 monthly

290000s from £739.95 monthly

292000s from £744.95 monthly

294000s from £749.95 monthly

296000s from £754.95 monthly

298000s from £759.95 monthly

300000s from £764.95 monthly

302000s from £769.95 monthly

304000s from £774.95 monthly

306000s from £779.95 monthly

308000s from £784.95 monthly

310000s from £789.95 monthly

312000s from £794.95 monthly

314000s from £799.95 monthly

316000s from £804.95 monthly

318000s from £809.95 monthly

320000s from £814.95 monthly

322000s from £819.95 monthly

324000s from £824.95 monthly

326000s from £829.95 monthly

328000s from £834.95 monthly

330000s from £839.95 monthly

332000s from £844.95 monthly

334000s from £849.95 monthly

336000s from £854.95 monthly

338000s from £859.95 monthly

340000s from £864.95 monthly

342000s from £869.95 monthly

344000s from £874.95 monthly

346000s from £879.95 monthly

348000s from £884.95 monthly

350000s from £889.95 monthly

352000s from £894.95 monthly

354000s from £899.95 monthly

356000s from £904.95 monthly

358000s from £909.95 monthly

360000s from £914.95 monthly

362000s from £919.95 monthly

364000s from £924.95 monthly

366000s from £929.95 monthly

368000s from £934.95 monthly

370000s from £939.95 monthly

372000s from £944.95 monthly

374000s from £949.95 monthly

376000s from £954.95 monthly

378000s from £959.95 monthly

380000s from £964.95 monthly

382000s from £969.95 monthly

384000s from £974.95 monthly

386000s from £979.95 monthly

388000s from £984.95 monthly

390000s from £989.95 monthly

392000s from £994.95 monthly

394000s from £999.95 monthly

396000s from £1004.95 monthly

398000s from £1009.95 monthly

400000s from £1014.95 monthly

402000s from £1019.95 monthly

404000s from £1024.95 monthly

406000s from £1029.95 monthly

408000s from £1034.95 monthly

410000s from £1039.95 monthly

412000s from £1044.95 monthly

414000s from £1049.95 monthly

416000s from £1054.95 monthly

418000s from £1059.95 monthly

420000s from £1064.95 monthly

422000s from £1069.95 monthly

424000s from £1074.95 monthly

426000s from £1079.95 monthly

428000s from £1084.95 monthly

430000s from £1089.95 monthly

432000s from £1094.95 monthly

434000s from £1099.95 monthly

436000s from £1104.95 monthly

438000s from £1109.95 monthly

440000s from £1114.95 monthly

442000s from £1119.95 monthly

444000s from £1124.95 monthly

446000s from £1129.95 monthly

448000s from £1134.95 monthly

450000s from £1139.95 monthly

452000s from £1144.95 monthly

454000s from £1149.95 monthly

456000s from £1154.95 monthly

458000s from £1159.95 monthly

460000s from £1164.95 monthly

462000s from £1169.95 monthly

464000s from £1174.95 monthly







## Holiday bookings network

HOLIDAY firm Owners Services Ltd has replaced its IBM 3704 front end processor and 3270-based teleprocessing network with a 3280 system from ITT Business Systems.

The 3280 network consists of 12 controllers and 165 VDUs at locations including London, Manchester, Newcastle and Glasgow.

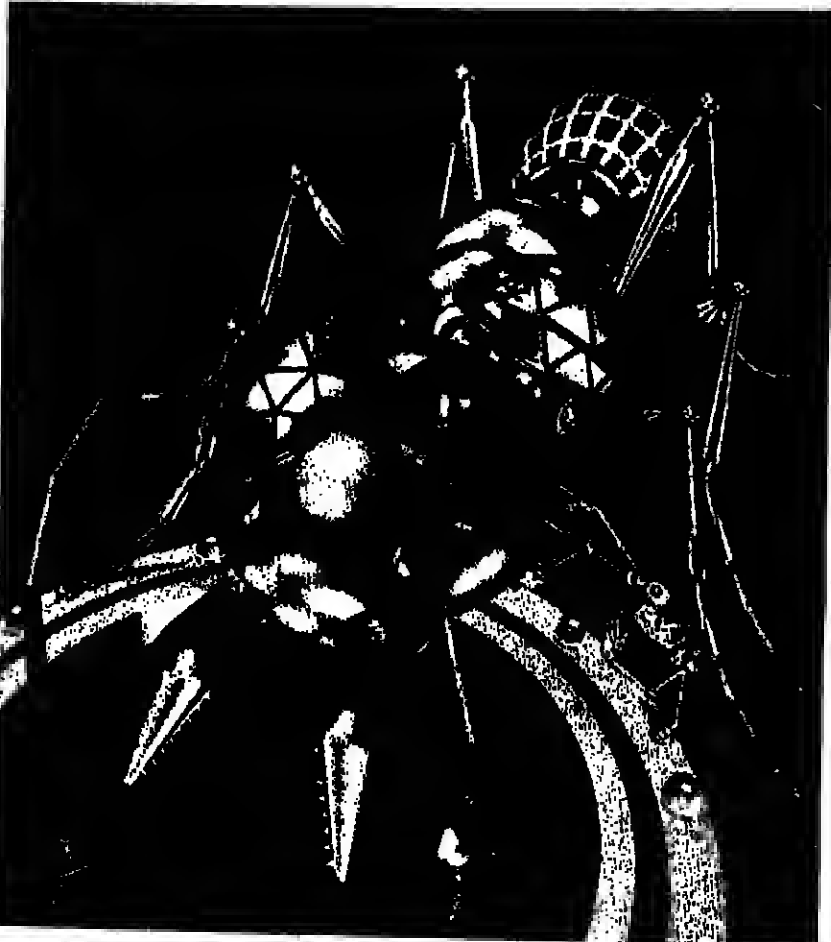
They are linked to two IBM 4341 mainframes located at OSL headquarters in Broomfield, Herts. The 4341s are front ended by an ITT 3805 programmable communications controller which has replaced the 3704.

There are plans to enhance the functions of the 3805 with ITT's Multiple Access Facility software which enables VDUs in the network to switch between applications.

MAF is part of ITT's Communications Network Architecture, which is offered by the company as an alternative to IBM's Systems Network Architecture.

The main application at present is online access to information on availability of OSL holiday villas and apartments and the airline seats sold by OSL and subsidiary company Wings.

## SPECTACULAR DEMONSTRATIONS AT COMPUTER GRAPHICS CONFERENCE IN LONDON



## Bridging gap between science and art

THE excitement caused in the film industry by developments in digital animation and computer-controlled effects is leading workers in the field to foresee the day when the line between real film images and artificial ones is completely erased. So heard the audience at Computervision '81 computer graphics conference in London, where some spectacular demonstrations were mounted by such organisations as Lucas-films, makers of Star Wars, and New York Institute of Technology.

Very high resolution graphics and elaborate software is already enabling NYIT staff to produce animated figures on a video screen that incorporate fine surface textures, realistic specular reflections, and shadows so that the images are almost indistinguishable from models. This combined with the flexibility of animation is opening up enormous new possibilities in film production, and Lance Williams of the Institute staff is already planning a science fiction film to be called "The Works" featuring weird mechanical anti-like creatures.

Scene from "The Works," an animated science-fiction film produced with the aid of computer graphics.

tervision '81 were also digital reproductions of still pictures, including hints of nature, such as valleys and bodies. People have told Miller that they remind them of things they seen in their dreams. He said the images could not possibly be in reality, and he would not thought them up without the computer.

Nils Jorgensen, of Polymed Hamburg, and Michael Jones, San Francisco Communication raised the point that, far from being a toy as it was largely regarded now, computer graphics are becoming an essential communications tool as the information became too great to handle linearly in words. The information economy demanded the use of these techniques, they said.

The advertising industry, the leading edge of using technology, Computer Visualisation TV commercials before finally filmed is becoming an important technique, and some images are already being rated into commercials.

The conference was also commercial for a Canon video that even managed to show a VDU image with a film image of the actual object, a tricky operation.

Commented organiser Tomment of Logica, "We are setting up a new threshold of perception, and at the same time bridging the gap between science and artistic cultures."

### Lasers

In straight photographic filming, computers are being explored as a means of processing images after they are shot, and helping to combine separate shots.

Alvy Ray Smith, from the rapidly expanding computer development division of Lucas-films, described the research being done to find an effective means of digitising film and then printing it out again after manipulation. This will probably be done with lasers, he said.

The aim is to produce resolution-independent software so that future technical refinement of optical equipment will not be held back. He saw no chance of video replacing film as the basic medium used, because of the inferior quality even of 1500-line television pictures.

Computers are already being used to control the movement of models, for instance of spacecraft, and to manage the logistics of film production, Smith said. Image synthesis, digital audio, and computerised editing are all being worked on.

The capacity crowd at Computervision '81 was still in the EPROM form, thus delaying its release.

He wanted to include a drive for the printer peripheral, which is planned for release in the middle of this year. This would avoid having to develop yet another version of the Basic ROM.

Sinclair at the time denied rumours that software bugs were the cause and said the chip would be ready early this year. His only comment now is that "it will be available shortly".

The 16K RAM package designed to extend the standard 1K of RAM and replace the 3K byte expansion boards was announced at the same time as the ROM and has been available for six weeks.

The 8K Basic ROM chip was designed to enhance the ZX80 by replacing the 4K ROM original. There is no upward compatibility, as the two chips contain slightly different Basic.

The reason given by Clive Sinclair was that extra functions were to be incorporated while the

Having repaid its £125,000 to the NBB, SDIL will now go to the private sector for long finance.

While the NBB looks set to off its SPL holding fairly soon, the moment to get rid of it appears to be making no sense. The minority holdings are linked to other computer firms linked to Insect Systems, Logic and On-line. In CAP has changed as a result of the major takeover within that company.

A spokesman for Logic said in Edinburgh said that the deal resulted from an approach by the NBB from his company, he stressed that IIC and the new shareholders would have part in the management of SDIL. The latter employs 320 people and is the holding company for Systems Designers Ltd, its biggest member company.

When the NBB said it was an "essential preview to a public quotation in the next few years".

A number of Irel's US customers accepted changed offers last week, but the basic offer was reduced to a payment of £100,000 in return for the machine over the next two years.

At least one customer has agreed to accept a replacement machine as a replacement for the machine he had bought last year, but he has not yet agreed to keep the machine for two years.

## MICRO NEWS

## Colour computer from Tandy poses threat to the Commodore VIC

TANDY'S TRS80 Colour Computer, which was announced at the same time as the Model Three and the pocket computer (CW, August 14, 1980) is to be released in the UK in August.

At a retail price of about \$399 in the US, Tandy's colour computer could pose a threat to the newly announced VIC colour computer from Commodore.

The VIC 20 is to be released at Easter (CW, November 27, 1980) and is expected to sell in the UK for under £200.

### Prestel

The six-month delay between the US and UK launch, according to Tandy, was to allow for the conversion to British standard colour television, PAL. The company is hoping to fit a Prestel adapter interface to the system.

Two versions, 4K and 16K, come with advanced graphics capabilities, prepackaged ROM, cartridges and a cassette facility for home and educational use. A 40 column screen VDU will cost an extra \$399.

The VIC 20 will also sell without a monitor, but will be useable only with a 20 column screen VDU. A 40 column system, the VIC 40, will be available by the end of the year, according to Commodore.

With 5K of RAM expandable to 32K the VIC system, which is Japanese designed, will also be aimed at home and educational use. It will run ROM cartridges and have a cassette facility.

Like the Pet systems, the VIC 20 is based on the 6502 8-bit microprocessor from Commodore's subsidiary, MOS Technology. It also uses a special video interface chip called a VIC which

incorporates RAM, ROM and video control circuitry.

The TRS 80 colour computer uses Motorola's 6809 8-bit processor with 16-bit internal architecture.

On the software scene, the TRS80 will run either colour Basic or extended colour Basic, while the VIC 20 runs Pat Basic, probably stored in 12K of ROM.

### Software

Pet software will need to be especially adapted for the VIC, but the user will have an extra facility available - programmable function keys.

Both systems have a single RS232 serial port for cassette and other peripherals. Commodore has planned a single floppy disc drive and a printer, while Tandy just specifies a disc facility and a printer.



Mike Rees, winner of the Best Business Idea Award.

## Award for business brainwave

AN AWARD of £300 has gone to Mike Rees, a research assistant in electronic engineering at University College Cardiff, for a data communications interface for use with the Commodore Pet desk top computer.

The competition, organised by the Welsh Development Agency, aimed to find the best business idea from university researchers. The interface is needed to connect the Pet to a Post Office approved modem so that data can be transmitted via telephone lines. It uses Zilog's Z80 8-bit microprocessor which enables the system to monitor the status of the modem, alerting the operator in any fault on the line, as well as pass the data.

### Motorola plant

MOTOROLA plans to invest \$22 million in a semiconductor manufacturing and testing plant in Sri Lanka. It will employ 2,000 people and start production in 1982.

## Book for ZX80 users — but no ROM

MAKING the Most of Your ZX80 is the title of a new book for first-time ZX80 users written by Tim Hartnell, co-ordinator of the National ZX80 Users Club. Clive Sinclair, originator of the ZX80 personal computer, has already ordered 1,000 copies which will be sold through Sinclair Research in Cambridge.

Selling for £5.95, the book describes programming the ZX80 from first principles and contains over 60 complete programs, an active display routine and a breakdown of the features of the new ROM, for which users have been waiting a long time.

After a decisive and well publicised launch at the end of last summer (CW, September 11, 1980), the 8K Basic ROM chip, was mysteriously whisked off the market six weeks later (CW, October 16, 1980).

The reason given by Clive Sinclair was that extra functions were to be incorporated while the

chip was still in the EPROM form, thus delaying its release.

He wanted to include a drive for the printer peripheral, which is planned for release in the middle of this year. This would avoid having to develop yet another version of the Basic ROM.

Sinclair at the time denied rumours that software bugs were the cause and said the chip would be ready early this year. His only comment now is that "it will be available shortly".

The 16K RAM package designed to extend the standard 1K of RAM and replace the 3K byte expansion boards was announced at the same time as the ROM and has been available for six weeks.

The 8K Basic ROM chip was designed to enhance the ZX80 by replacing the 4K ROM original. There is no upward compatibility, as the two chips contain slightly different Basic.

## MOS growth rate levelling off — European report

THE European Metal Oxide Semiconductor (MOS) market will have grown at a rate of 21% per year over a five-year period up to 1985, according to a study by Eurotechnique. Previous growth was reported to be 33.7% from 1978-79 and 26.1% from 1979-80.

Total sales over the five-year period are expected to increase over 100% from \$750 million in 1980 to \$1,945 million in 1985. In 1980, memories represented about one-third of total sales, logic circuits another third, microprocessors one-fifth and circuits for consumer products, such as watches the remainder.

By 1985, MOS memory sales will reach the \$760 billion level, according to the report. The com-

pany also considers that microprocessor sales should be around \$900 million and logic sales around \$575 million.

Most growth is forecast in memories and microprocessors, but in both cases growth is expected to "slow down rapidly". Memories grew by 50% from 1978-79, but the 1984-85 figure is expected to be between 22 and 24%. Microprocessor growth is expected to decrease from 30% in 1978-79 to 25-30% per year by 1985.

For 1981, Eurotechnique predicts a \$530 million market for memories and a \$215 million market for microprocessors. Growth for 1980-81 is expected to be 22.2% for memories and 43.3% for micro.

### Motorola sticks to 68000 plans

WITH the announcement that the first peripheral chip for the 68000 16-bit microprocessor is now available, Motorola has kept to its planned schedule for the release of the 68000 family over the next two years.

The 68120 intelligent peripheral controller is programmable by the user and comprises a serial

device, 21 parallel I/O lines, eight operating modes and 128 bytes of dual access RAM. It has a 6801, 816-bit processor on board, 2K bytes of ROM, and a 16-bit counter.

Next on the schedule for release are the 68122 terminal node controller and the 68300 error detection and correction chip.

## Argus 700 Series 2.

## Multipower multispeed multichoice multiprocessor.



### Flexibility

Argus 700 Series 2 is based on new versions of the Argus 700F and G central processors which can be used individually or in closely coupled groups supported by a multiprocessor operating system.

In its various configurations it's a package designed to meet the needs of almost all control, communications and information handling applications. A cost effective system, competitively priced.

### Speed

At the top end of the range Argus 700 Series 2 offers processing speeds of up to two million instructions per second.

There's a local and cache memory for each Argus 700F and a cache memory for Argus 700G. Result: reduced load on the memory bus, speeding processing by as much as 60%.

### Reduced Load

Intelligent channels with fixed programmes handle routine operations. They have access to the memory bus and operate in parallel with central processors, reducing the central processors' load substantially.

### Security

No other computer company has more experience than Ferranti in designing dual computer systems for critical, high security tasks.

The architecture of Argus 700 Series 2 provides for pairs of computers to share memory and backing stores and to access common input/output devices.

From the system builders:  
The system builders' computer.

Contact:  
Equipment Sales, Ferranti Computer Systems Limited,  
Simonsway, Wythenshawe, Manchester M22 5LA  
Telephone 051-499 3355 Telex 66800

Name \_\_\_\_\_  
Position \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_

**FERRANTI**  
Computer Systems

# Our singles will turn you on.

We have a range of hit Single Board Computers which can't be topped: Processors, Memories, Analog I/Os, Floppy-Disc- and CRT Controllers.

Also in the National Charts are Complete systems (including chassis), Single board computers for full temperature range, Input/output expansions, Boards with memory and I/O ports.

The National Offensive for the 80s.

**National Semiconductor**  
THE QUEEN'S AWARD FOR TECHNOLOGICAL ACHIEVEMENT 1980

To: National Semiconductor (UK) Ltd,  
Sales Office  
301 Hurpur Centre, Hurpur Lane  
Hoddeston MK40 1 TR  
Tel: 01344 7111 Telex: 526209

OFFICIAL DISTRIBUTORS:  
SHEPHERD & Associates Ltd, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.







## OP SPOT

# When £80 a week is a small fortune

OPERATORS earning £4,031 a year can consider themselves as doing fairly well, according to a recent survey released in mid-January. National Analysis of Salaries and Wages is published by Reward Regional Surveys of Stone, Staffs.

The £4,031 is a median figure arrived at as a result of inquiries to 132 companies. The people who conducted the survey, which is based on all jobs in 293 private sector companies, stress the difference between a median and an average figure.

By ranking salaries from the highest to the lowest, the median salary is the one which stands at

the middle of the list. It is more sensible to quote median rather than average figures because the latter tend to be distorted by freak high and low figures.

Similarly, it means more to quote the quartiles and deciles of Table 1. A fictionist of jargon will be pleased to learn that 50% of the entries fall between the upper and lower quartile and the range between upper and lower deciles is 90%.

The Computer Users' Year Book for 1980 has operations as a slightly more remunerative job. Its 1980 median salary figure for ops is £4,111 which is, incidentally, an

	senior operator	operator
Upper decile	£8,784	£5,500
Upper quartile	£6,050	£4,740
Median	£5,350	£4,031
Lower quartile	£4,646	£3,588
Lower decile	£4,036	£3,170

Table 1: How does your salary match up to what is on this chart? Reproduced by courtesy of Reward Regional Surveys Ltd.

18.23% increase on the 1979 annual salary of £3,477.

A senior operator, according to CUYB, could have compared his pay cheque with a median figure of £5,531 in 1980.

In the six months since spring 1980, the Reward Regional survey found operators' salaries to have increased by 10% while senior operators fared slightly better with a 13% median increase. That amounts to £398 and £650 respectively.

More generally, the survey gets into the almost inevitable business of making predictions although

one relates specifically to DP.

It says: "Recent low pay awards are still insufficient to make much impact on pay statistics. Rises over the six months show an annual rate of 17% and over the year the change has been 19%.

"So, pay rises are slowing down but not, as yet, dramatically." For 1981, increases of between 12½% and 14½% are predicted.

Taking the median predicted increase figure of 13½% - and placing a degree of trust in the findings of the survey - an operator would be justified in demanding an autumn 1981 pay rise of £554.

## How to make op safe against the industrial wrong

SOME computer operators have the opportunity to be dishonest on a large scale. But most cases of operator crime never come to light because it is not in a company's interest to publicise how it has been done.

Mulling lists, payroll and profit details and budget plans can all be of value. The op, who is often not earning a great deal, has easy access to the goods and is a prime target for temptation. That's the opinion of Malcolm Fry.

Fry says of his 15-year career in operations: "There isn't a job I haven't done." Now he is planning to publish a book on operations espionage.

"The op is someone low down the hierarchy with access to secret information denied to those with a far higher status," Fry explains. In order to minimise operator crime, he makes a number of draconian suggestions.

He thinks that security should be tightened with an alarm connected to the guard's office once the computer room is left vacant for

the night. Ops should be given passes and should be given secret access.

"Every time an op notices," continues Fry, "he is excited from the knowledge that he is in a position to do something. While an op is in the computer room, he or she is allowed to take a bag into the room.

"I know it seems a bit silly," but it is the only way to prevent the op from taking a bag of hard copy materials.

He recommends that should be destroyed by drivers should be able to have the opportunity to remove the tape from a tape drive.

Perhaps the most important suggestion is that the op should be given a mortgage should be removed from the company's payroll.

Fry reckons that such a move for confirming the op's status as a marking recognition of importance.

## You, too, can be a sailing vessel

I FACED Christmas with a degree of uncertainty about my human identity. I had just subjected myself to the Murraby Differential Test Battery, part of which sought to make a comparison between my personality and a sailing boat with outboard motors.

Three and a half hours were spent fiddling sequences, doing mental arithmetic and the like and some days later I was given measurements of "concept speed, perseverance, personal confidence and intellectual confidence."

Those qualities, in that order, were equated with a sail, a keel and two outboard motors. It turned out that I was a fairly well-balanced kind of boat with a huge personal confidence-cum-outboard motor that forced me to go round in circles.

Should you have an idle moment on the night shift, you could

rough up on a good and set up shop as an analyst.

Have your subject sailing dinghy put through this test (I did, gave regular chunter on about the greater ability to lose it to put them into action).

Another Mickey Mouse and pencil test is to make four drawings in square, an upside down circle and a square.

The square is meant to represent the future, the circle of sex and the full circle of fulfillment. Obviously, the

In a similar vein, you could say that people's test one of three categories: man or bird. I'm a man with a horse's face but home is a nice and safe is a railway line.

## Consumers' crusade

GRAHAM LUND is a busy man. Apart from lecturing on operations and being ops manager for the Royal London Mutual in Colchester (Op Spot, January 8), he is chairman of the IBM CUA operation group.

Lund is standing down from the chairman's job in April, having done it for three years; however, he plans to become a CUA council member.

He says of the CUA: "We have no link with IBM and are completely autonomous. We're not a pressure group and don't wish to be seen as such. Our prime objec-

tive is to bring IBM up to date with the problems of the user."

The CUA is an international, multi-national association of IBM users with over 1,500 members.

The NDU is a similar association of users of the same truck which delivers to the CUA and NDU.

Now IBM is a system of transportation. The next CUA meeting is in Nottingham on 27.

## Protocol makes its debut

PROTOCOL Operations' first event, Education and Training in Computer Operations, will be free.

A date for when this new training company has to offer, the first forum will be at the Coburg Hotel in Bedfordshire, on February 12.

The event will be chaired by Graham Lund, and Phil Wilson is one of the speakers. Lund had strong links with Protocol Operations, which was founded in its early days by the firm and its

aim to talk about the "AI" that has been the subject of much discussion.

He added: "We want to see the future of the computer industry. If you want to know more about the future of the computer industry, please come to our book's day."

## COMPANY NEWS

## CAP Gemini Sogeti takes over Norwegian consultancy

THE giant French-based computer services group, CAP Gemini Sogeti, has extended its empire with the acquisition of the Norwegian software consultancy Data Logic. The latter firm was owned by Data Logic of the UK until 1972 when it was bought by its Norwegian employees.

According to CGS, Data Logic is the largest Norwegian company in the field of

professional computing services, excluding service bureaux. It employs 56 professional staff and chalked up a turnover of well over \$2 million in 1980, although this is trivial compared with the turnover of its new parent company.

CGS expects to report approaching FF600 million for 1980.

CGS has high hopes for rapid growth at

Data Logic in view of the boost to Norway's economy from North Sea oil.

Data Logic's existing customers include banks, shipping companies, the Norwegian government and the computer industry, including Norway's biggest domestically owned computer firm, Norsk Data.

The CGS empire in Northern Europe al-

ready includes companies in Sweden, West Germany, the Netherlands, Belgium and Switzerland. In the UK CGS jointly owns IAL Gemini with International Aeradio.

Last autumn CISI, the computer services subsidiary of the French Atomic Energy Commission, sold its 34% share in CGS to a group of French financial organisations.

CGS now has 3,000 staff.

## ICL shares still on the slide

ICL shares continued their downward slide and sank a further 10p to 48p last week. Stockbrokers Heseltine Moss predicted the shares would hold temporarily around 50p, and then fall to 30p.

Reports from the company suggest some improvement in overseas orders but this will probably still be at a high price in terms of profitability.

The breakdown of the talks in Geneva on Namibian independence has brought nearer an international trade embargo on South Africa, and simultaneously a threat to ICL's best market in Africa.

## Investment trust nets £97,000

EDINBURGH-based Independent Investment Trust, one of the biggest UK holders of shares in US high technology companies, and a major beneficiary from the Apple share launch had gross income of £330,000 for the six months ending December 1980. After interest, tax and other charges this worked out at £97,000 net.

Independent Investment trades on the unlisted securities market at a current price of 117p. The following companies appear among its holdings: Apple Computer (£50,000); Centronics (£25,000); Data I/O (£34,884); Lanier Business Products (£85,000) and Sensoromatic (£80,000). The company holds 875,000 shares in United Scientific Holdings and 90,000 shares in Wilmart R&D, both UK companies.

## General Electric buys US Cad/Cam manufacturer

CALMA, one of the world's leading manufacturers of Computer Aided Design/Computer Aided Manufacturing systems, is being bought by the giant General Electric Co of the US for \$180 million.

The deal has been welcomed by Calma executives because GE is a far bigger user of Cad/Cam systems than its existing parent, United Telecommunications of Kansas City, Missouri.

There are two unusual aspects to the deal. One is that GE will pay United Telecom an additional amount in 1985 depending on the performance of Calma in the years 1981 to 1984. It could be as much as \$70 million.

This other is that under the US anti-trust laws GE may have to sell off the large minority share it

currently holds in another leading Cad/Cam firm, Applienn. GE's 22.7% holding in Applienn is assigned to its venture capital division, Business Development Services Inc, while the 100% being taken in Calma will lead to it becoming part of GE's Industrial Electronics Business Group.

Calma points out that it will remain completely autonomous after the GE takeover. At the same time it expects to get all or most of GE's annual expenditure on Cad/Cam systems which is now running at about \$20 million.

Based at Sunnyvale, California, Calma has established a temporary headquarters for Europe at Kingston-upon-Thames, Surrey, but is going ahead with its plans to set up a permanent HQ nearer London Airport.

## Dollar lost on every sale

CONSOLIDATED Computer Inc, a company owned by the Canadian government and Fujitsu of Japan and with 10% of its shares publicly traded, has reported losses of £9 million on sales of \$9.7

million for the first nine months of the year. Consolidated, which manufactures Key edit equipment supplied to ICL and Fujitsu, lost over \$10 million on sales of \$22.7 million last year.

## New machinery

O'Malley has just signed a £1.4 million cheque for a Univac 1100/62 to replace one of the bureau's pair of maximum configuration 1100s and will install an 1100/61 machine in place of the other early this year.

In addition it is upgrading its IBM 370/148 to a 3431 at a cost of £500,000 and took on new offices in London's Centre Point last year.

The new machines are part of a three-year investment programme at the bureau's Milton Keynes base, aimed at strengthening its position in engineering and scientific, City and institutional, and special commercial applications. The latter includes the provocatively-named Scicopath database on road junctions for the Ministry of Transport.

Up to 20% revenues for both Scicon Consultancy International and Scicon Computer Services came from parent company, BP. The two companies' accounts do not include the results of SCIS; the Scicon company in West Germany.

## CW SHARES TABLE

Date: 10/1/81			Index: 90.12 Change: -4.64				
London Stock Exchange			US Stocks				
Stock		Price	Stock		Price		
High	Low	C/Change	High	Low	C/Change		
158	111	A Comp Tech (Hof)	118	-13	2		
118	111	B Comp Tech (Hof)	215	208	Carroll Comshare	215	+1
118	111	C Comp Tech (Hof)	215	208	Control Data	215	+1
118	111	D Comp Tech (Hof)	215	208	Digital Equipment	215	+1
118	111	E Comp Tech (Hof)	215	208	Electronic Data	215	+1
118	111	F Comp Tech (Hof)	215	208	General Electric	215	+1
118	111	G Comp Tech (Hof)	215	208	Hewlett-Packard	215	+1
118	111	H Comp Tech (Hof)	215	208	IBM	215	+1
118	111	I Comp Tech (Hof)	215	208	IBM (Pakistan Data)	215	+1
118	111	J Comp Tech (Hof)	215	208	IBM (Japan)	215	+1
118	111	K Comp Tech (Hof)	215	208	IBM (France)	215	+1
118	111	L Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	M Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	N Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	O Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	P Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	Q Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	R Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	S Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	T Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	U Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	V Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	W Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	X Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	Y Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	Z Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	AA Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	AB Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	AC Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	AD Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	AE Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	AF Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	AG Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	AH Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	AI Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	AJ Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	AK Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	AL Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	AM Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	AN Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	AO Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	AP Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	AQ Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	AR Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	AS Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	AT Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	AV Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	AW Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	AX Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	AY Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	AZ Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	BA Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	BB Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	BC Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	BD Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	BE Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	BF Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	BG Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	BH Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	BI Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	BJ Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	BK Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	BL Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	BM Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	BN Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	BO Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	BP Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	BQ Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	BR Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	BS Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	BT Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	BV Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	BW Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	BX Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	BY Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	BZ Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	CA Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	CB Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	CC Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	CD Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	CE Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	CF Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	CG Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	CH Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	CI Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	CJ Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	CK Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	CL Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	CM Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	CN Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	CO Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	CP Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	CQ Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	CR Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	CS Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	CT Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	CU Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	CV Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	CW Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	CX Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	CY Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	CZ Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	DA Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	DB Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	DC Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	DD Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	DE Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	DF Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	DG Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	DH Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	DI Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	DJ Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	DK Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	DL Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	DM Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	DN Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	DO Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	DP Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	DQ Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	DR Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	DS Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	DT Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	DU Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	DV Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	DW Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	DX Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	DY Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	DZ Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	EA Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	EB Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	EC Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	ED Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	EE Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	EF Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	EG Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	EH Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	EI Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	EJ Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	EK Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	EL Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	EM Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	EN Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	EO Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	EP Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	EQ Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	ER Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	ES Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	ET Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	EU Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	EV Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	EW Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	EX Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	EY Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	EZ Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	FA Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	FB Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	FC Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	FD Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	FE Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	FF Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	FG Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	FH Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	FI Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	FJ Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	FK Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	FL Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	FM Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	FN Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	FO Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	FP Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	FQ Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	FR Comp Tech (Hof)	215	208	IBM (India)	215	+1
118	111	FS Comp Tech (Hof)	215	208	IBM (USA)	215	+1
118	111	FT Comp Tech (Hof)	215	208	IBM (Canada)	215	+1
118	111	FU Comp Tech (Hof)	215	208	IBM (Brazil)	215	+1
118	111	FV Comp Tech (Hof)	215	208	IBM (Argentina)	215	+1
118	111	FW Comp Tech (Hof)	215	208	IBM (Italy)	215	+1
118	111	FX Comp Tech (Hof)	215	208	IBM (India)	215	+1</





Robin Lane, seated at Portway School's Cado 20 computer, and Michael Rees (right) are two of the 17-year-olds who have started a company, Software Six, supplying services to other Cado users. Profits return to the school - and headmaster John Larkin looks on approvingly.

## Sixth form goes into business

IT'S not only policemen that are getting younger - so are entrepreneurs. You don't even need to have left school these days before starting your own business.

Sixth formers at the Portway School, Bristol, have set up a company, Software Six, which will use the school's own Cado 20 system to take over some of the services now offered to other Cado users by UK distributors DRG Business Machines of Weston-super-Mare and London. DRG's managing director, Mike Kilmarin, described how he had loaned the school a Cado a year ago. "They have turned out some remarkably good programmers. We have no hesitation in using them for some of our overall work."

Software Six cut its teeth on such in-school activities as examination administration, time-keeping, and pupil records. A mark of confidence is that its next task is to tackle computerising school accounts.

Executives of Software Six are three 17-year-olds: Michael Rees, managing director, his deputy Robin Lane, and financial director Gerry Nash.

Between them, the three must run the company as a properly constituted commercial organisation with shareholders and company accounts - no doubt put on the Cado.

One difference, though, is that all profits go back to the school so it won't be a get-rich-quick exercise for the gang of three. But if it comes to experience...

The whole project is part of the Young Enterprise Scheme and a fatherly eye will be kept on progress by ISC Chemicals of Avonmouth, which sponsors the school under the scheme.

**Puzzler**

WHAT is the next number in this sequence, given that the "intervals" between each pair of adjacent figures (1, 2, 2, 2, 7, 59, 21) are not significant?

See page 43 for solution.

Despite my valiant efforts on December 11, to rule out dual solutions, several readers have come up with alternative layouts. One of these is in fact of great theoretical interest, since the four "quarters" (2, 12, 57, 9, 12, 4, 4, 8, 3, 1) and 7, 3, 6, 10) also total the Magic Constant of 26. Here it is:

1	9		
2	12	4	8
5	7	3	11
6	10		

# 'Micro'-techniques to serve the incurable

AS I walked down the long corridors of the Royal Hospital for Incurables at Putney, a door opened on my left and I looked into a huge room under a curving ornate ceiling.

It was the ballroom when this hospital served as a private house of a well-to-do family living in central London. Now it bore the faint marks of an institution, and was filled with chairs.

The Royal boasts an abundance of chairs - mostly wheelchairs to house the disabled patients. But this hospital is a far from depressing place to visit.

Most people seem happy, more so than outside the hospital; but for some, the severely disabled who cannot talk or write, life trapped in a wheelchair can be a lonely business.

It is towards these patients that a new project undertaken by the hospital computer department is aimed.

Using micros, they hope to reach - and ultimately test - the intellectual capacity of patients who hitherto have been unable to communicate.

Dr J. Wedgwood explained that severe physical handicap can mask a normal and active intelligence. "It is important to test the mental function of each patient, so that

treatment can be prescribed."

Two other members of the project team are psychologist Sarah Wilson and computer specialist Geoffrey Wylie. Sarah is concerned primarily with the tests and in administering them to patients.

"At the moment we are concentrating on IQ-type and memory tests. One we are using is a variation of Raven's Matrices, where images of six pictures are shown on the screen and the next in sequence must be chosen from an array," said Sarah.

All the tests are multiple choice so in most cases the patient just has to indicate one number.

## Special input

Dr Wedgwood intervened: "One of our big problems is that many patients have such severe motor impairment they cannot depress a key with one finger."

"We have had to design special input devices, such as a sensitive pressure bar with extremely large key-pads, so that the whole hand or even tongue could be used. It is fitted with an anti-bounce mechanism to iron out tremors."

"Others we are working on are using breath control - Inhalation and exhalation to move a cursor

around a screen - and the harnessing of sounds, where a patient can only vary the volume, in a marker. Light signals are another possibility in investigation."

There are about 270 patients at Putney and 30 more at a centre in Brighton. All are adults and between a third and a half are so disabled as to fall into the class described by Dr Wedgwood.

Ten per cent of all patients are motor accident victims, while half are spastics or suffer from diseases like multiple sclerosis, Parkinson's or Stokes.

"Our eventual aim is to make up a battery of our own tests that we can standardise against existing psychological ones. In that way, they would be suitable for our particular needs, but assessable," Sarah Wilson explained.

Scoring may be a bit of a problem. Many tests are time-dependent - the Byesek ones, for example - while most of our patients cannot be time-restricted.

"I think we'll have to establish norms for our group of subjects, and then compare individual patients against them."

"One advantage is that the scores can be totted up quite impartially by the computer; there's no danger of experimental bias from it."

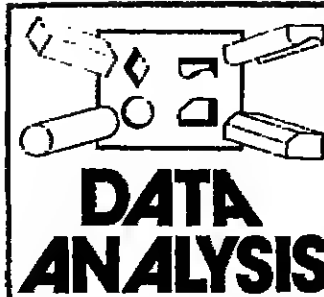
I asked what the long-term needs were. "More and more we're working on a fully fledged, but a graphics package is useful so that we can work to do things, like the tests."

Geoffrey Wylie agreed, a responsible for the computer aspects of the project and both the hardware - and linked to a specially large screen - and video programs, mainly in the bit of machine code.

He said, "Luckily, there are constraints on program but we want them open as soon as possible. They'll keep me busy for a few weeks."

Sarah explained the longer-term aims. "What we would like to do is to have a terminal that the hospital at Putney can use where any patient can use even play computer games. It would be a bit like the inputs could link the hospital outside world."

"Perhaps we may even be able to teach the patients to use it would counteract the boredom they face now."



THIS series has been concerned with describing the techniques CACI employs to analyse and design systems, but very little has been said as yet on how the techniques fit together into the stages of a project.

Once all the techniques have been covered, the last articles will be devoted to describing the sequencing of tasks, but it is worth describing briefly the phases which will have been completed before access path analysis is started, in order that the technique can be placed in context.

Access path analysis normally begins once the framework for the project has been completed, in the form of global entity model, functional hierarchies and data flow diagrams for the upper levels. In addition, a development strategy should have been agreed, selecting the areas for detailed analysis and defining which areas and functions are to be computerised.

The access path analysis technique described in this and the next article is part of the detailed analysis phase of a project. It is a method of determining and documenting the functions' use of data.

The purpose of access path analysis are as follows:

- To check the entity model to ensure that all necessary entity types and relationship types are recorded.
- To provide the database designer with all the basic information needed for database design.
- To bring the results of functional analysis together so that if there are changes to the function it is clear which changes are needed to the model, and there are changes to the model it is clear whether it affects the functions.
- To help the systems analyst develop a clear understanding of his system in terms of the data structure.

# The technique of access path analysis

## Section I - Part 14

of our series describing a system design methodology

by Rosemary Rock-Evans

- To provide all the basic information for the next phases in the project: entity life cycles, transaction design, program design.

Functional decomposition provides the analyst with a function hierarchy of all the functions and sub-functions which the business performs.

At the detailed analysis stage, the functions which are to be computerised are known, and it is a subset of these functions which are analysed during access path analysis.

These are the functions which are triggered by events external to the area to be supported by the computer system.

As an example we will use the "Make Tea" function (see Figure 1) and assume that we are designing a computer robot system.

It has been decided that the robot cannot be trusted with laying out the tea things, but can be taught to boil the water in the kettle, warm the teapot, put the teabag in the teapot and pour the boiling water in the teapot. He cannot be trusted with pouring out the tea.

The external event which will

start the robot working is thus the "Make Tea" event, where it is assumed that we can lay out the tea things while he is doing the rest.

We will tell the robot all he needs to start his part of the make tea function, i.e. whether or not the teapot is warm. Once he has performed the tasks involved in the "Boil Water in Kettle," "Warm Teapot," and "Put Teabag in Teapot" functions, however he cannot proceed any further, because information on the event of the kettle having boiled is needed.

He has thus produced "output" - a warm, tea-filled teapot and a boiling kettle, but he can go no further until we tell him the kettle has boiled. Then he can perform the "Pour Boiling Water into Teapot" function.

The two functions we would therefore analyse during access path analysis would have been the part of the "Make Tea" function which included the "Boil Water," "Put Tea in Teapot" and "Warm Teapot" functions, and then a second function: "Pour Boiling Water in Teapot." We may in fact have redrawn our function hierarchy to cater for this change before doing this study, so that the three computerised sub-functions are grouped together under one function.

What important points about the functions thus emerge from this example?

- Firstly, the function has one input, i.e. all the information needed to complete the function is available to it at the time it is being performed. (For example, a set of exchanges between a terminal user and a system in an online environment would be included within this definition.)
- Secondly, multiple outputs may result.
- Thirdly, the function must be capable of being performed as an interrupted activity. This does not mean that it has to be performed from beginning to end every time - the functions may have to be aborted because of invalid input, e.g. No Teabags. The function must not, therefore, contain sub-functions which are triggered by other events during its performance.

When we reach the stage in design where the transactions are actually being designed (i.e. elementary functions, as they are known), the designer may choose to make more than one transaction initiating the same elementary function: for processing requests, e.g. to deal with exception conditions or an online environment. Alternatively he may group elementary functions under one transaction, e.g. "where the function being performed are sufficiently similar, not in need of separate transactions." In this case, the function "Validity Arrives" generates the function "Make Tea." "Validity Arrives" might cause the function "Remake Tea." The tasks

involved may be sufficiently similar to need only one transaction with an indication of which event was being processed.

It should be noted, however, that a transaction is not an elementary function.

Access path analysis is documented using functional models, which represent the entity types and relationship types involved in the elementary function with symbols superimposed to denote usage; and an access path for a function form (described in the next article).

In Figure 2 the diagrammatic conventions used to represent retrieval are shown. Some example functions are listed below to illustrate each type of update.

1. Retrieve a patient's name, age, sex and date of birth.
2. Find all patients who are over 50 and male.
3. List all the outstanding appointments for a patient.
4. List all the appointments which the patient has had with the doctor.

In Figure 3 the diagrammatic conventions used to represent updates are shown. Some example functions are listed below to illustrate each type of update.

1. Record the details of a new patient.
2. Record details of the illness of a patient.
3. Change the name of a patient.
4. Delete details of a patient.

The entity model and descriptions of the elementary functions

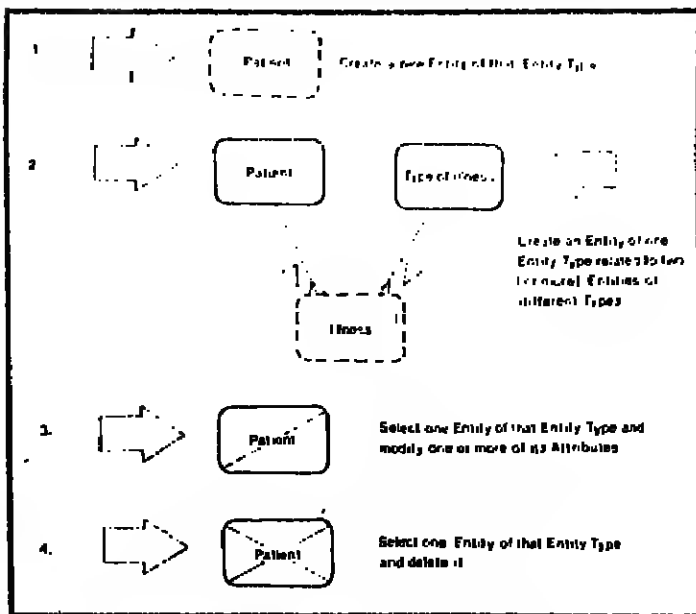


Figure 3. Diagrammatic conventions: types of update.

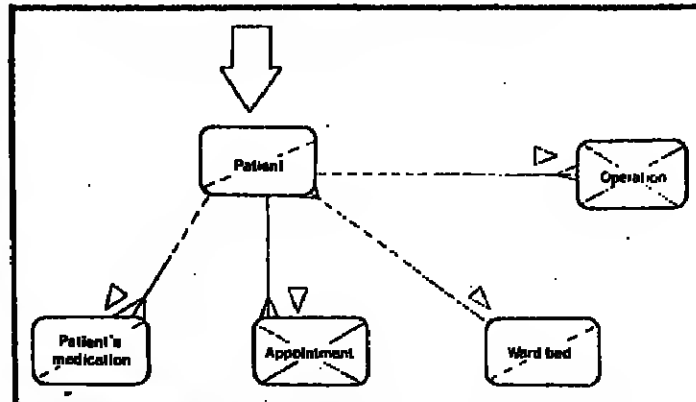


Figure 4. Functional Model: Handling Patient's Death.

are used to draw the functional models.

From the function description, the entity type(s) where the function begins, and specific entities selected, are determined.

The description of the function is then worked through to find the other entity types and relationship types involved, in the order in which they are needed.

A functional model is constructed. In Figure 4 the functional model for the very simple function:

"Handle Patient's Death" is shown. In this article the basic rules for determining elementary functions have been described and the diagrammatic conventions used to draw functional models have been discussed. In Part 15, some more complex functions will be examined and documented using the access path usage form.

## PEOPLE and EVENTS

### DP manager promoted to director at IBM

THE board of directors of IBM Ltd. has elected Richard Marriott, director of IBM United Kingdom, to the post of deputy director of IBM Ltd. Mr. Marriott has been appointed public affairs director.

He was born in Hampshire and educated at Wellington College, the Royal Military Academy, Sandhurst (where he was awarded the Queen's Medal) and at the University of Cambridge, where he gained an honours degree in Mathematics.

Between 1961 and 1967 he served with the Gurkha Rifles in the Far East, including a spell of two years in private secretary to the Governor of North Borneo.

In 1967 his experience in the computer industry began when he joined IBM UK as a data processing salesman. He has since held several management positions both at the company's head office and the Bristol branch office.

Until his new appointment he was DP manager, South Western.



Alan Sooler has been appointed managing director of AM Vantage. Terry Cave has been appointed deputy managing director of the company.

John Collins has been appointed computer products sales engineer at Ampex. He joins the company from Data Translation.

Tom Walter, managing director of ICS Computers, has been elected chairman of the Irish Computer Services Association. Pat Chambers of COPS is vice-chairman.

Cave joined the company in 1970 and held several sales and management positions until his appointment as managing director of Control Data.

Several other senior management appointments announced by the company include Neil Spooner, regional manager of technical services, Brian Marice who takes over as regional manager

### New post at Racal-Redac

THE newly created position of deputy managing director at Racal-Redac has been filled by Bill Hillier, who has played a major role in developing the company's computer-aided design system. The appointment comes at a time when the company is expanding into the markets of the US and Europe.

Hillier will be responsible for all activities on the Tewkesbury, Gloucestershire, site where development of CAD systems takes place. He will also co-ordinate research and development

programmes in West Germany, France and Scandinavia. Previously, he worked for a number of years in the development of automated test equipment. In 1970 he joined Racal, where he was promoted to technical director in 1974.

Victor Oshl has been appointed assistant marketing manager at ESO Devices. He joins the company from ESO Africa Inc where he was previously an adviser to the managing director.

Mike Henry has joined CMC as a manager, responsible for the North Area and Scotland. He joins from ICL.

Geoff Squire has been appointed group manager at CACI. He joins from ICL where he served as regional market manager.

### Deputy MD at Control Data

MANAGING director of Control Data, Terry Cave has added to his responsibilities within the company. He has been appointed deputy managing director of Control Data, the computer manufacturing, marketing and services subsidiary of the US company Control Data Corp.

Cave joined the company in 1970 and held several sales and management positions until his appointment as managing director of Control Data.

Several other senior management appointments announced by the company include Neil Spooner, regional manager of technical services, Brian Marice who takes over as regional manager

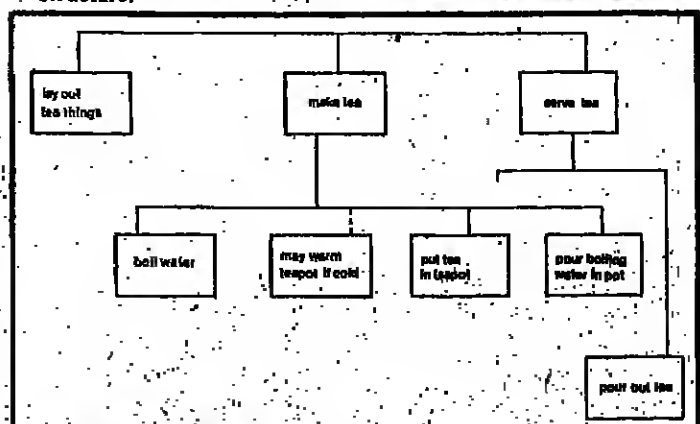


Figure 1. Function hierarchy.

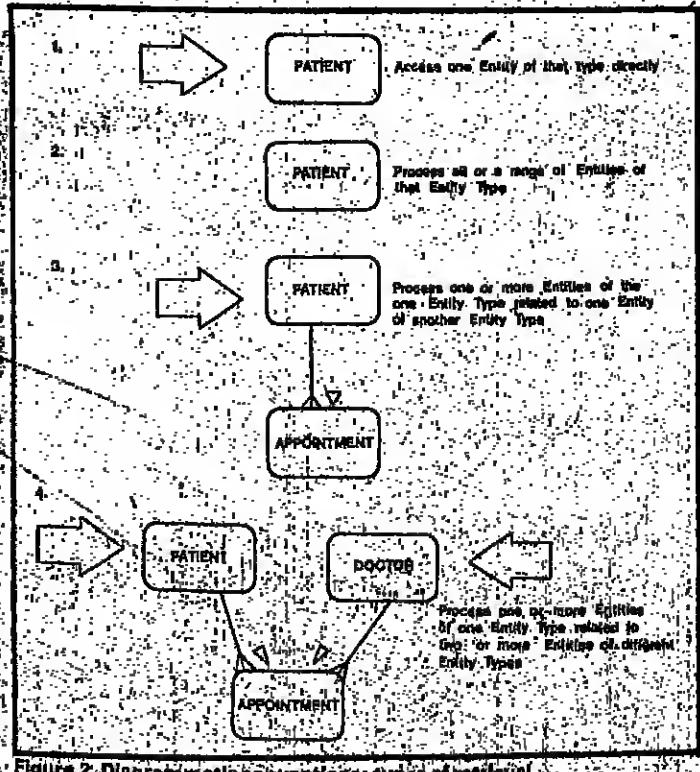


Figure 2. Diagrammatic conventions: types of update.

TDS offer the ADDS Regent 20 for as little as...

**£399**

it's the Best for the least

A superbly styled terminal, full upper & lower case, crisp easy to read 5 x 8 characters in a 24 x 80 character format. EIA interface: speeds up to 9600 baud. Full incremental cursor movement and addressability - auxiliary output interface; print transparent capability - plus monitor mode... all this for only £399. If you can find a higher value terminal at a lower cost than buy it.

And... while limited stock lasts, here's an even better opportunity

The ASCOT Tektronix compatible graphics terminal for just

**£999**

The ASCOT terminal will give you 64K x 256 graphics with full Tektronix 4010 emulation.

To take advantage of these low prices ring our action desk on 0254 676021

TDS Ltd, Pinner Road, Wembley, Middlesex, London GB 87H

Each unit under £20

Prices exclusive of VAT add 10% to your order

Please send me...

Enclose cheque to the value of £...

Name: Delivery Address:



# FINANCING THE COMPUTER

Financing the computer is a problem which has nurtured a tangled jungle of knowledge as convoluted as the innards of any mainframe. In this special supplement one of our own reporters looks at an entrepreneurial leasing company.

pany, Computer Financing; Parry Mitchell of United Leasing explains the role of his company as does Daphne Kandiah of Hamilton Rentals; and Allen Pawlyn advises on whether to rent, lease or buy.

## Cashing in on a booming market

by a Staff Reporter

KEEPING a watchful eye on a simple ratio could have avoided the horrors of multi-million dollar losses on computer leasing currently being agonised over by the Lloyd's insurance market.

There is the equally simple lesson being drawn by Peter Hunt, chairman and owner of Computer Financing, from the debacle caused by the collapse of IBM 370 values after the launch of the 4300 range in early 1979.

The ratio is the comparison between monthly rental cost and purchase price. IBM typically set its rental charge so that 48 monthly payments equalled outright sale price, says Hunt.

When that ratio on the later (38/148) models had crept up to something like 1:1 by late 1977, there was clearly something going on.

### Field day

IBM was encouraging the purchase of equipment which was to be superseded shortly. But US leasing companies continued to assume the same residual values (proportion of the cost not covered by lease payments) as before and had a short-term field day during which they were able to undercut IBM's rentals and maintain profit margins.

This upshot - which is history

as they say - was that Lloyd's of London and other insurers were left holding policies on equipment valued way above actual resale prices.

Hunt says that this shows up another vital aspect of the computer leasing business. Almost uniquely, secondhand values of IBM computers depend not on the physical age of the machine but on the age of the range.

A 3033 bought today will have virtually the same resale value as the same machine bought when the range was first introduced, Hunt notes.

Hunt also avoided leasing 3033 models as he reckoned the fact that they basically contained 370 architecture made 3033s vulnerable to the launch of a radically new IBM series. At the time of their launch, he was rearing up to the 4300 range and had ordered around 24 million of machines as his first foray into leasing.

Similarly, Hunt now sees the H-series 3081 as causing a substantial fall in 3033X secondhand values. A 3031 bought new for between £600-700,000, for example, can now be had for around £200,000 secondhand.

Ergo, any leasing company working on a residual of more than that, or unable to re-lease and bring in income getting down to

that amount is in trouble before 3081 deliveries start to flow at the end of this year.

Hunt, 42, is that well-known animal in the financial world - the entrepreneur. With a background as programmer, then salesman, with NCR his first involvement with leasing came at Standard Chartered Bank on postings to Amsterdam and Düsseldorf.

A first venture on his own account in 1976, with Logan White in Middlesbrough, came to an ignominious end after a row between the two partners.

A year later, with finance from various property deals, he formed Computer Financing to trade in secondhand IBM equipment - essentially buying on spec and then selling to leasing and renting companies.

Profits were slim, in what was a warehouse operation, however, so Computer Financing began to supply and users in 1978.

Late that year, with a £3 million turnover already under his belt, Hunt began to expand what was still essentially a one-man operation, buying the IDC listing for the UK and Europe. With this database giving details of all IBM sites, together with the kit configura-



Seeing the lighter side of life in the leasing market are (left to right): Peter C. Hunt, chairman of Computer Financing International Ltd; Max Cowper-Smith, resident lawyer at Computer Financing International Ltd; and Stephen J. Measures, international sales director of Computer Financing.

tion; Hunt started the laborious task of working through the Computer Users' Year-book searching for prospects, with the object of getting into leasing.

### Controversy

Leasing has been generating much controversy of late. Some of it has been related to the collapse of Irel and the horrendous claims faced by Lloyd's.

Still more has stemmed from the controversy over flexible leasing. A lease agreement can be terminated by a separate agreement, provided the lease takes another machine from the flexible leasing company.

This has attractions for the DP manager, whose main concern is to avoid restricting operation and meet the usually growing needs of his company.

But on one occasion at least a company which thought it could get out of a lease agreement with

the lessor (the bank) because the flexible leasing company would pay the residual, found itself with a water-tight agreement with the lessor and a less-than-stable flexible leasing company.

An article in last November's Law Society Gazette, which circulates among solicitors, warned lessees to ensure that minimum terms of replacement machine leases should be stated in the main body of the agreement, with the rate.

The article said that the lessee may be left in a difficult position, dependent on flexible leasing companies staying in business and honouring obligations. If a company should cease to trade, the lessee will be left with a long-term obligation on the original machine, the solicitor author of the article added.

Hunt is anxious to distance Computer Financing from such operations and engaged Max Cowper-Smith as his resident la-

wyer last July, a prime move being to impress clients with Computer Financing's ultra-tight approach.

"Our job is to give the lessee enough manoeuvrability to get out of a price," he says, "but we don't promise to do it without endeavour to sell on or to your original machine and put money back to you."

Hunt stresses that in fact there is only one lease agreement with its termination clause bedded in the main body.

Hunt says his leasing operation will really take off when the deliveries of his 12 model 3081 come through - at a total cost of £24 million.

"Having kept clear of the 3081, IBM are making it all right for people to buy those, it's not repeating itself," Hunt remarks that he can cash in on what he sees as a booming leasing market.

## What is IBM leasing?

FOR IBM computers, leasing works like this. A leasing company seeks out a user - a lessee - which needs an IBM machine. The lessee agrees to take one from the leasing company and to pay a monthly rental charge.

This is intended to cover the leasing company's payments to a bank for the money for the machine, plus an extra margin of interest. The lessee pays, say, 10% interest.

The leasing company then goes to a bank and borrows the money for the machine at, say, 8% (an apparently low rate which will be explained in a moment). The 2% spread is the leasing company's profit.

The leasing company has to go to the bank because it does not have enough money to pay IBM for all the machines it wants to lease. It cannot find all the lease money to itself.



"Sorry - you can't use it yet we're still working out the leasing agreement."

Because the leasing company has limited funds, it assigns the lease stream from the lessee to the bank. In fact, the bank discounts the lease stream over the period of value (NPV) of that stream to the leasing company.

The leasing company pays IBM

for the machine, but ownership of the computer (and this is the important point) passes to the bank for the remainder of the lease. The bank has become the lessor.

In practice, these operations take place simultaneously. The leasing company acts as intermediary between the bank (in fact, it may be a part of the bank) which has the money and the user which needs the machine.

In some cases the rental stream received from the lessee will not go on long enough to cover the whole cost of the computer. The shortfall is called the residual and needs to be found either through selling the machine or its return at the end of the lease or through another lease. Part of the leasing company's skill is to leave as low a residual as possible.

Why does the user go to the leasing company?

Because they make more

(tying up his capital) or rent to IBM.

Why does the bank go to leasing?

Because it is a company with large profits and so is liable to pay taxes. If it buys capital goods it offers their value against tax in its first year of purchase.

This is why it funds a lease - hire - purchase since under leases ownership equipment does not pass to the bank to the leasing company is why it is prepared to lend at well below market interest.

Since the allowance runs for the first year, banks set up subsidiaries with financial coding on different dates throughout the year, in fact they can finance leases of the year and take full advantage of the allowances.

Why do leasing companies

exist? Because they make more

## If it's a question of which terminal to choose, we'll give you The TOTAL Answer

It isn't just that we supply high quality terminals from leading manufacturers such as DEC, Hewlett-Packard, Tektronix, Diablo and Texas Instruments - there's much, much more.

For a start we've got branches throughout the UK with full demonstration facilities and technical staff to advise on the most suitable terminal for your applications.

Next, we offer a very flexible rental scheme, with or without a Purchase Option, which includes on-site maintenance. This gives you the opportunity to evaluate equipment prior to purchase and upgrade any time without penalty.

Alternatively, if you decide to take advantage of our competitive sale prices, we'll give you a full 90 days warranty.

Finally, our Service Group provide Maintenance Agreements for all equipment in our range. These cover you for not only routine upkeep of equipment but act as an effective emergency service to minimise computer 'downtime'.

To find out more, contact your nearest branch today. If you've got any questions, one phone call could give you The TOTAL Answer.



## The TOTAL Answer HAMILTON

To: Technical Sales Division - Hamilton - Hamilton House  
North Circular Road London NW10 7UB

I am interested in the following terminals:

Name \_\_\_\_\_  
Company \_\_\_\_\_  
Position \_\_\_\_\_  
Address \_\_\_\_\_  
Tel No. \_\_\_\_\_

Hamilton Rentals Limited  
Hamilton House  
North Circular Road  
London NW10 7UB

London 01-861 6777  
Birmingham 021-236 3561  
Manchester 061-846 8335/8434  
Central Scotland 0501 43182  
Aberdeen 0224 25301

Paris  
Düsseldorf  
Toronto  
New York

## SWEEP RECEPTION AWAY!

CALL 01-602 4502  
COMPUTER BROKING SERVICES

Leading brokers in DEC®  
used computer systems,  
peripherals, modules & spares

IBM 3033-U12  
AVAILABLE - NOW (NEW)  
IBM 3158-K00  
AVAILABLE NOW

3033-U6  
MARCH '81  
3148-K00  
FEB. '81

3031-4  
FEB. '81

4341-4  
FEB. '81

Telephone 0926 495291 CPS COMPUTER GROUP, BLACKFRIARS HOUSE, WARWICK  
FROM CPS LEASING AND BROKERS  
+ 3333 3340 3350 3380 3803  
+ 3330 3343 3370 3830 3420











# Appointments

## THE NEWSPAPER COMPUTER PEOPLE RELY ON Appointments

### COMPUTER WEEKLY

Classified Department, Quadrant House, The Quadrant, Sutton, Surrey SM7 5AS

Box Numbers: Should be addressed to the box number in the advertisement in Computer Weekly at the above address.

Classified Rates: £19 per line (10 x 3 cols - 10/27, 20 x 3 cols - £14.70, 30 x 3 cols - £17.10, 40 x 3 cols - £19.50, 50 x 3 cols - £21.90, 60 x 3 cols - £24.30, 70 x 3 cols - £26.70, 80 x 3 cols - £29.10, 90 x 3 cols - £31.50, 100 x 3 cols - £33.90, 110 x 3 cols - £36.30, 120 x 3 cols - £38.70, 130 x 3 cols - £41.10, 140 x 3 cols - £43.50, 150 x 3 cols - £45.90, 160 x 3 cols - £48.30, 170 x 3 cols - £50.70, 180 x 3 cols - £53.10, 190 x 3 cols - £55.50, 200 x 3 cols - £57.90, 210 x 3 cols - £60.30, 220 x 3 cols - £62.70, 230 x 3 cols - £65.10, 240 x 3 cols - £67.50, 250 x 3 cols - £69.90, 260 x 3 cols - £72.30, 270 x 3 cols - £74.70, 280 x 3 cols - £77.10, 290 x 3 cols - £79.50, 300 x 3 cols - £81.90, 310 x 3 cols - £84.30, 320 x 3 cols - £86.70, 330 x 3 cols - £89.10, 340 x 3 cols - £91.50, 350 x 3 cols - £93.90, 360 x 3 cols - £96.30, 370 x 3 cols - £98.70, 380 x 3 cols - £101.10, 390 x 3 cols - £103.50, 400 x 3 cols - £105.90, 410 x 3 cols - £108.30, 420 x 3 cols - £110.70, 430 x 3 cols - £113.10, 440 x 3 cols - £115.50, 450 x 3 cols - £117.90, 460 x 3 cols - £120.30, 470 x 3 cols - £122.70, 480 x 3 cols - £125.10, 490 x 3 cols - £127.50, 500 x 3 cols - £129.90, 510 x 3 cols - £132.30, 520 x 3 cols - £134.70, 530 x 3 cols - £137.10, 540 x 3 cols - £139.50, 550 x 3 cols - £141.90, 560 x 3 cols - £144.30, 570 x 3 cols - £146.70, 580 x 3 cols - £149.10, 590 x 3 cols - £151.50, 600 x 3 cols - £153.90, 610 x 3 cols - £156.30, 620 x 3 cols - £158.70, 630 x 3 cols - £161.10, 640 x 3 cols - £163.50, 650 x 3 cols - £165.90, 660 x 3 cols - £168.30, 670 x 3 cols - £170.70, 680 x 3 cols - £173.10, 690 x 3 cols - £175.50, 700 x 3 cols - £177.90, 710 x 3 cols - £180.30, 720 x 3 cols - £182.70, 730 x 3 cols - £185.10, 740 x 3 cols - £187.50, 750 x 3 cols - £189.90, 760 x 3 cols - £192.30, 770 x 3 cols - £194.70, 780 x 3 cols - £197.10, 790 x 3 cols - £199.50, 800 x 3 cols - £201.90, 810 x 3 cols - £204.30, 820 x 3 cols - £206.70, 830 x 3 cols - £209.10, 840 x 3 cols - £211.50, 850 x 3 cols - £213.90, 860 x 3 cols - £216.30, 870 x 3 cols - £218.70, 880 x 3 cols - £221.10, 890 x 3 cols - £223.50, 900 x 3 cols - £225.90, 910 x 3 cols - £228.30, 920 x 3 cols - £230.70, 930 x 3 cols - £233.10, 940 x 3 cols - £235.50, 950 x 3 cols - £237.90, 960 x 3 cols - £240.30, 970 x 3 cols - £242.70, 980 x 3 cols - £245.10, 990 x 3 cols - £247.50, 1000 x 3 cols - £249.90, 1010 x 3 cols - £252.30, 1020 x 3 cols - £254.70, 1030 x 3 cols - £257.10, 1040 x 3 cols - £259.50, 1050 x 3 cols - £261.90, 1060 x 3 cols - £264.30, 1070 x 3 cols - £266.70, 1080 x 3 cols - £269.10, 1090 x 3 cols - £271.50, 1100 x 3 cols - £273.90, 1110 x 3 cols - £276.30, 1120 x 3 cols - £278.70, 1130 x 3 cols - £281.10, 1140 x 3 cols - £283.50, 1150 x 3 cols - £285.90, 1160 x 3 cols - £288.30, 1170 x 3 cols - £290.70, 1180 x 3 cols - £293.10, 1190 x 3 cols - £295.50, 1200 x 3 cols - £297.90, 1210 x 3 cols - £300.30, 1220 x 3 cols - £302.70, 1230 x 3 cols - £305.10, 1240 x 3 cols - £307.50, 1250 x 3 cols - £309.90, 1260 x 3 cols - £312.30, 1270 x 3 cols - £314.70, 1280 x 3 cols - £317.10, 1290 x 3 cols - £319.50, 1300 x 3 cols - £321.90, 1310 x 3 cols - £324.30, 1320 x 3 cols - £326.70, 1330 x 3 cols - £329.10, 1340 x 3 cols - £331.50, 1350 x 3 cols - £333.90, 1360 x 3 cols - £336.30, 1370 x 3 cols - £338.70, 1380 x 3 cols - £341.10, 1390 x 3 cols - £343.50, 1400 x 3 cols - £345.90, 1410 x 3 cols - £348.30, 1420 x 3 cols - £350.70, 1430 x 3 cols - £353.10, 1440 x 3 cols - £355.50, 1450 x 3 cols - £357.90, 1460 x 3 cols - £360.30, 1470 x 3 cols - £362.70, 1480 x 3 cols - £365.10, 1490 x 3 cols - £367.50, 1500 x 3 cols - £369.90, 1510 x 3 cols - £372.30, 1520 x 3 cols - £374.70, 1530 x 3 cols - £377.10, 1540 x 3 cols - £379.50, 1550 x 3 cols - £381.90, 1560 x 3 cols - £384.30, 1570 x 3 cols - £386.70, 1580 x 3 cols - £389.10, 1590 x 3 cols - £391.50, 1600 x 3 cols - £393.90, 1610 x 3 cols - £396.30, 1620 x 3 cols - £398.70, 1630 x 3 cols - £401.10, 1640 x 3 cols - £403.50, 1650 x 3 cols - £405.90, 1660 x 3 cols - £408.30, 1670 x 3 cols - £410.70, 1680 x 3 cols - £413.10, 1690 x 3 cols - £415.50, 1700 x 3 cols - £417.90, 1710 x 3 cols - £420.30, 1720 x 3 cols - £422.70, 1730 x 3 cols - £425.10, 1740 x 3 cols - £427.50, 1750 x 3 cols - £429.90, 1760 x 3 cols - £432.30, 1770 x 3 cols - £434.70, 1780 x 3 cols - £437.10, 1790 x 3 cols - £439.50, 1800 x 3 cols - £441.90, 1810 x 3 cols - £444.30, 1820 x 3 cols - £446.70, 1830 x 3 cols - £449.10, 1840 x 3 cols - £451.50, 1850 x 3 cols - £453.90, 1860 x 3 cols - £456.30, 1870 x 3 cols - £458.70, 1880 x 3 cols - £461.10, 1890 x 3 cols - £463.50, 1900 x 3 cols - £465.90, 1910 x 3 cols - £468.30, 1920 x 3 cols - £470.70, 1930 x 3 cols - £473.10, 1940 x 3 cols - £475.50, 1950 x 3 cols - £477.90, 1960 x 3 cols - £480.30, 1970 x 3 cols - £482.70, 1980 x 3 cols - £485.10, 1990 x 3 cols - £487.50, 2000 x 3 cols - £489.90, 2010 x 3 cols - £492.30, 2020 x 3 cols - £494.70, 2030 x 3 cols - £497.10, 2040 x 3 cols - £499.50, 2050 x 3 cols - £501.90, 2060 x 3 cols - £504.30, 2070 x 3 cols - £506.70, 2080 x 3 cols - £509.10, 2090 x 3 cols - £511.50, 2100 x 3 cols - £513.90, 2110 x 3 cols - £516.30, 2120 x 3 cols - £518.70, 2130 x 3 cols - £521.10, 2140 x 3 cols - £523.50, 2150 x 3 cols - £525.90, 2160 x 3 cols - £528.30, 2170 x 3 cols - £530.70, 2180 x 3 cols - £533.10, 2190 x 3 cols - £535.50, 2200 x 3 cols - £537.90, 2210 x 3 cols - £540.30, 2220 x 3 cols - £542.70, 2230 x 3 cols - £545.10, 2240 x 3 cols - £547.50, 2250 x 3 cols - £549.90, 2260 x 3 cols - £552.30, 2270 x 3 cols - £554.70, 2280 x 3 cols - £557.10, 2290 x 3 cols - £559.50, 2300 x 3 cols - £561.90, 2310 x 3 cols - £564.30, 2320 x 3 cols - £566.70, 2330 x 3 cols - £569.10, 2340 x 3 cols - £571.50, 2350 x 3 cols - £573.90, 2360 x 3 cols - £576.30, 2370 x 3 cols - £578.70, 2380 x 3 cols - £581.10, 2390 x 3 cols - £583.50, 2400 x 3 cols - £585.90, 2410 x 3 cols - £588.30, 2420 x 3 cols - £590.70, 2430 x 3 cols - £593.10, 2440 x 3 cols - £595.50, 2450 x 3 cols - £597.90, 2460 x 3 cols - £600.30, 2470 x 3 cols - £602.70, 2480 x 3 cols - £605.10, 2490 x 3 cols - £607.50, 2500 x 3 cols - £609.90, 2510 x 3 cols - £612.30, 2520 x 3 cols - £614.70, 2530 x 3 cols - £617.10, 2540 x 3 cols - £619.50, 2550 x 3 cols - £621.90, 2560 x 3 cols - £624.30, 2570 x 3 cols - £626.70, 2580 x 3 cols - £629.10, 2590 x 3 cols - £631.50, 2600 x 3 cols - £633.90, 2610 x 3 cols - £636.30, 2620 x 3 cols - £638.70, 2630 x 3 cols - £641.10, 2640 x 3 cols - £643.50, 2650 x 3 cols - £645.90, 2660 x 3 cols - £648.30, 2670 x 3 cols - £650.70, 2680 x 3 cols - £653.10, 2690 x 3 cols - £655.50, 2700 x 3 cols - £657.90, 2710 x 3 cols - £660.30, 2720 x 3 cols - £662.70, 2730 x 3 cols - £665.10, 2740 x 3 cols - £667.50, 2750 x 3 cols - £669.90, 2760 x 3 cols - £672.30, 2770 x 3 cols - £674.70, 2780 x 3 cols - £677.10, 2790 x 3 cols - £679.50, 2800 x 3 cols - £681.90, 2810 x 3 cols - £684.30, 2820 x 3 cols - £686.70, 2830 x 3 cols - £689.10, 2840 x 3 cols - £691.50, 2850 x 3 cols - £693.90, 2860 x 3 cols - £696.30, 2870 x 3 cols - £698.70, 2880 x 3 cols - £701.10, 2890 x 3 cols - £703.50, 2900 x 3 cols - £705.90, 2910 x 3 cols - £708.30, 2920 x 3 cols - £710.70, 2930 x 3 cols - £713.10, 2940 x 3 cols - £715.50, 2950 x 3 cols - £717.90, 2960 x 3 cols - £720.30, 2970 x 3 cols - £722.70, 2980 x 3 cols - £725.10, 2990 x 3 cols - £727.50, 3000 x 3 cols - £729.90, 3010 x 3 cols - £732.30, 3020 x 3 cols - £734.70, 3030 x 3 cols - £737.10, 3040 x 3 cols - £739.50, 3050 x 3 cols - £741.90, 3060 x 3 cols - £744.30, 3070 x 3 cols - £746.70, 3080 x 3 cols - £749.10, 3090 x 3 cols - £751.50, 3100 x 3 cols - £753.90, 3110 x 3 cols - £756.30, 3120 x 3 cols - £758.70, 3130 x 3 cols - £761.10, 3140 x 3 cols - £763.50, 3150 x 3 cols - £765.90, 3160 x 3 cols - £768.30, 3170 x 3 cols - £770.70, 3180 x 3 cols - £773.10, 3190 x 3 cols - £775.50, 3200 x 3 cols - £777.90, 3210 x 3 cols - £780.30, 3220 x 3 cols - £782.70, 3230 x 3 cols - £785.10, 3240 x 3 cols - £787.50, 3250 x 3 cols - £789.90, 3260 x 3 cols - £792.30, 3270 x 3 cols - £794.70, 3280 x 3 cols - £797.10, 3290 x 3 cols - £799.50, 3300 x 3 cols - £801.90, 3310 x 3 cols - £804.30, 3320 x 3 cols - £806.70, 3330 x 3 cols - £809.10, 3340 x 3 cols - £811.50, 3350 x 3 cols - £813.90, 3360 x 3 cols - £816.30, 3370 x 3 cols - £818.70, 3380 x 3 cols - £821.10, 3390 x 3 cols - £823.50, 3400 x 3 cols - £825.90, 3410 x 3 cols - £828.30, 3420 x 3 cols - £830.70, 3430 x 3 cols - £833.10, 3440 x 3 cols - £835.50, 3450 x 3 cols - £837.90, 3460 x 3 cols - £840.30, 3470 x 3 cols - £842.70, 3480 x 3 cols - £845.10, 3490 x 3 cols - £847.50, 3500 x 3 cols - £849.90, 3510 x 3 cols - £852.30, 3520 x 3 cols - £854.70, 3530 x 3 cols - £857.10, 3540 x 3 cols - £859.50, 3550 x 3 cols - £861.90, 3560 x 3 cols - £864.30, 3570 x 3 cols - £866.70, 3580 x 3 cols - £869.10, 3590 x 3 cols - £871.50, 3600 x 3 cols - £873.90, 3610 x 3 cols - £876.30, 3620 x 3 cols - £878.70, 3630 x 3 cols - £881.10, 3640 x 3 cols - £883.50, 3650 x 3 cols - £885.90, 3660 x 3 cols - £888.30, 3670 x 3 cols - £890.70, 3680 x 3 cols - £893.10, 3690 x 3 cols - £895.50, 3700 x 3 cols - £897.90, 3710 x 3 cols - £900.30, 3720 x 3 cols - £902.70, 3730 x 3 cols - £905.10, 3740 x 3 cols - £907.50, 3750 x 3 cols - £909.90, 3760 x 3 cols - £912.30, 3770 x 3 cols - £914.70, 3780 x 3 cols - £917.10, 3790 x 3 cols - £919.50, 3800 x 3 cols - £921.90, 3810 x 3 cols - £924.30, 3820 x 3 cols - £926.70, 3830 x 3 cols - £929.10, 3840 x 3 cols - £931.50, 3850 x 3 cols - £933.90, 3860 x 3 cols - £936.30, 3870 x 3 cols - £938.70, 3880 x 3 cols - £941.10, 3890 x 3 cols - £943.50, 3900 x 3 cols - £945.90, 3910 x 3 cols - £948.30, 3920 x 3 cols - £950.70, 3930 x 3 cols - £953.10, 3940 x 3 cols - £955.50, 3950 x 3 cols - £957.90, 3960 x 3 cols - £960.30, 3970 x 3 cols - £962.70, 3980 x 3 cols - £965.10, 3990 x 3 cols - £967.50, 4000 x 3 cols - £969.90, 4010 x 3 cols - £972.30, 4020 x 3 cols - £974.70, 4030 x 3 cols - £977.10, 4040 x 3 cols - £979.50, 4050 x 3 cols - £981.90, 4060 x 3 cols - £984.30, 4070 x 3 cols - £986.70, 4080 x 3 cols - £989.10, 4090 x 3 cols - £991.50, 4100 x 3 cols - £993.90, 4110 x 3 cols - £996.30, 4120 x 3 cols - £998.70, 4130 x 3 cols - £1001.10, 4140 x 3 cols - £1003.50, 4150 x 3 cols - £1005.90, 4160 x 3 cols - £1008.30, 4170 x 3 cols - £1010.70, 4180 x 3 cols - £1013.10, 4190 x 3 cols - £1015.50, 4200 x 3 cols - £1017.90, 4210 x 3 cols - £1020.30, 4220 x 3 cols - £1022.70, 4230 x 3 cols - £1025.10, 4240 x 3 cols - £1027.50, 4250 x 3 cols - £1029.90, 4260 x 3 cols - £1032.30, 4270 x 3 cols - £1034.70, 4280 x 3 cols - £1037.10, 4290 x 3 cols - £1039.50, 4300 x 3 cols - £1041.90, 4310 x 3 cols - £1044.30, 4320 x 3 cols - £1046.70, 4330 x 3 cols - £1049.10, 4340 x 3 cols - £1051.50, 4350 x 3 cols - £1053.90, 4360 x 3 cols - £1056.30, 4370 x 3 cols - £1058.70, 4380 x 3 cols - £1061.10, 4390 x 3 cols - £1063.50, 4400 x 3 cols - £1065.90, 4410 x 3 cols - £1068.30, 4420 x 3 cols - £1070.70, 4430 x 3 cols - £1073.10, 4440 x 3 cols - £1075.50, 4450 x 3 cols - £1077.90, 4460 x 3 cols - £1080.30, 4470 x 3 cols - £1082.70, 4480 x 3 cols - £1085.10, 4490 x 3 cols - £1087.50, 4500 x 3 cols - £1089.90, 4510 x 3 cols - £1092.30, 4520 x 3 cols - £1094.70, 4530 x 3 cols - £1097.10, 4540 x 3 cols - £1099.50, 4550 x 3 cols - £1101.90, 4560 x 3 cols - £1104.30, 4570 x 3 cols - £1106.70, 4580 x 3 cols - £1109.10, 4590 x 3 cols - £1111.50, 4600 x 3 cols - £1113.90, 4610 x 3 cols - £1116.30, 4620 x 3 cols - £1118.70, 4630 x 3 cols - £1121.10, 4640 x 3 cols - £1123.50, 4650 x 3 cols - £1125.90, 4660 x 3 cols - £1128.30, 4670 x 3 cols - £1130.70, 4680 x 3 cols - £1133.10, 4690 x 3 cols - £1135.50, 4700 x 3 cols - £1137.90, 4710 x 3 cols - £1140.30, 4720 x 3 cols - £1142.70, 4730 x 3 cols - £1145.10, 4740 x 3 cols - £1147.50, 4750 x 3 cols - £1149.90, 4760 x 3 cols - £1152.30, 4770 x 3 cols - £1154.70, 4780 x 3 cols - £1157.10, 4790 x 3 cols - £1159.50, 4800 x 3 cols - £1161.90, 4810 x 3 cols - £1164.30, 4820 x 3 cols - £1166.70, 4830 x 3 cols - £1169.10, 4840 x 3 cols - £1171.50, 4850 x 3 cols - £1173.90, 4860 x 3 cols - £1176.30, 4870 x 3 cols - £1178.70, 4880 x 3 cols - £1181.10, 4890 x 3 cols - £1183.50, 4900 x 3 cols - £1185.90, 4910 x 3 cols - £1188.30, 4920 x 3 cols - £1190.70, 4930 x 3 cols - £1193.10, 4940 x 3 cols - £1195.50, 4950 x 3 cols - £1197.90, 4960 x 3 cols - £1200.30, 4970 x 3 cols - £1202.70, 4980 x 3 cols - £1205.10, 4990 x 3 cols - £1207.50, 5000 x 3 cols - £1209.90, 5010 x 3 cols - £1212.30, 5020 x 3 cols - £1214.70, 5030 x 3 cols - £1217.10, 5040 x 3 cols - £1219.50, 5050 x 3 cols - £1221.90, 5060 x 3 cols - £1224.30, 5070 x 3 cols - £1226.70, 5080 x 3 cols - £1229.10, 5090 x 3 cols - £1231.50, 5100 x 3 cols - £1233.90, 5110 x 3 cols - £1236.30, 5120 x 3 cols - £1238.70, 5130 x 3 cols - £1241.10, 5140 x 3 cols - £1243.50, 5150 x 3 cols - £1245.90, 5160 x 3 cols - £1248.30, 5170 x 3 cols - £1250.70, 5180 x 3 cols - £1253.10, 5190 x 3 cols - £1255.50, 5200 x 3 cols - £1257.90, 5210 x 3 cols - £1260.30, 5220 x 3 cols - £1262.70, 5230 x 3 cols - £1265.10, 5240 x 3 cols - £1267.50, 5250 x 3 cols - £1269.90, 5260 x 3 cols - £1272.30, 5270 x 3 cols - £1274.70, 5280 x 3 cols - £1277.10, 5290 x 3 cols - £1279.50, 5300 x 3 cols - £1281.90, 5310 x 3 cols - £1284.30, 5320 x 3 cols - £1286.70, 5330 x 3 cols - £1289.10, 5340 x 3 cols - £1291.50, 5350 x 3 cols - £1293.90, 5360 x 3 cols - £1296.30, 5370 x 3 cols - £1298.70, 5380 x 3 cols - £1301.10, 5390 x 3 cols - £1303.50, 5400 x 3 cols - £1305.90, 5410 x 3 cols - £1308.30, 5420 x 3 cols - £1310.70, 5430 x 3 cols - £1313.10, 5440 x 3 cols - £1315.50, 5450 x 3 cols - £1317.90, 5460 x 3 cols - £1320.30, 5470 x 3 cols - £1322.70, 5480 x 3 cols - £1325.10, 5490 x 3 cols - £1327.50, 5500 x 3 cols - £1329.90, 5510 x 3 cols - £1332.30, 5520 x 3 cols - £1334.70, 5530 x 3 cols - £1337.10, 5540 x 3 cols - £1339.50, 5550 x 3 cols - £1341.90, 5560 x 3 cols - £1344.30, 5570 x 3 cols - £1346.70, 5580 x 3 cols - £1349.10, 5590 x 3 cols - £1351.50, 5600 x 3 cols - £1353.90, 5610 x 3 cols - £1356.30, 5620 x 3 cols - £1358.70, 5630 x 3 cols - £1361.10, 5640 x 3 cols - £1363.50, 5650 x 3 cols - £1365.90, 5660 x 3 cols - £1368.30, 5670 x 3 cols - £1370.70, 5680 x 3 cols - £1373.10, 5690 x 3 cols - £1375.50, 5700 x 3 cols - £1377.90, 5710 x 3 cols - £1380.30, 5720 x 3 cols - £1382.70, 5730 x 3 cols - £1385.10, 5740 x 3 cols - £1387.50, 5750 x 3 cols - £1389.90, 5760 x 3 cols - £1392.30, 5770 x 3 cols - £1394.70, 5780 x 3 cols - £1397.10, 5790 x 3 cols - £1399.50, 5800 x 3 cols - £1401.90, 5810 x 3 cols - £1404.30, 5820 x 3 cols - £1406.70, 5830 x 3 cols - £1409.10, 5840 x 3 cols - £1411.50, 5850 x 3 cols - £1413.90, 5860 x 3 cols - £1416.30, 5870 x 3 cols - £1418.70, 5880 x 3 cols - £1421.10, 5890 x 3 cols - £1423.50, 5900 x 3 cols - £1425.90, 5910 x 3 cols - £1428.30, 5920 x 3 cols - £1430.70, 5930 x 3 cols - £1433.10, 5940 x 3 cols - £1435.50, 5950 x 3 cols - £1437.90, 5960 x 3 cols - £1440.30, 5970 x 3 cols - £1442.70, 5980 x 3 cols - £1445.10, 5990 x 3 cols - £1447.50, 6000 x 3 cols - £1449.90, 6010 x 3 cols - £1452.30, 6020 x 3 cols - £1454.70, 6030 x 3 cols - £1457.10, 6040 x 3 cols - £1459.50, 6050 x 3 cols - £1461.90, 6060 x 3 cols - £1464.30, 6070 x 3 cols - £1466.70, 6080 x 3 cols - £1469.10, 6090 x 3 cols - £1471.50, 6100 x 3 cols - £1473.90, 6110 x 3 cols - £1476.30, 6120 x 3 cols - £1478.70, 6130 x 3 cols - £1481.10, 6140 x 3 cols - £1483.50, 6150 x 3 cols - £1485.90, 6160 x 3 cols - £1488.30, 6170 x 3 cols - £1490.70, 6180 x 3 cols - £1493.10, 6190 x 3 cols - £1495.50, 6200 x 3 cols - £1497.90, 6210 x 3 cols - £1500.30, 6220 x 3 cols - £1502.70, 6230 x 3 cols - £1505.10, 6240 x 3 cols - £1507.50, 6250 x 3 cols - £1509.90, 6260 x 3 cols - £1512.30, 6270 x 3 cols - £1514.70, 6280 x 3 cols - £1517.10, 6290 x 3 cols - £1519.50, 6300 x 3 cols - £1521.90, 6310 x 3 cols - £1524.30, 6320 x 3 cols - £1526.70, 6330 x 3 cols - £1529.10, 6340 x 3 cols - £1531.50, 6350 x 3 cols - £1533.90, 6360 x 3 cols - £1536.30, 6370 x 3 cols - £1538.70, 6380 x 3 cols - £1541.10, 6390 x 3 cols - £1543.50, 6400 x 3 cols - £1545.90, 6410 x 3 cols - £1548.30, 6420 x 3 cols - £1550.70, 6430 x 3 cols - £1553.10, 6440 x 3 cols - £1555.50, 6450 x 3 cols - £1557.90, 6460 x 3 cols - £1560.30, 6470 x 3 cols - £1562.70, 6480 x 3 cols - £1565.10, 6490 x 3 cols - £1567.50, 6500 x 3 cols - £1569.90, 6510 x 3 cols - £1572.30, 6520 x 3 cols - £1574.70, 6530 x 3 cols - £1577.10, 6540 x 3 cols - £1579.50, 6550 x 3 cols - £1581.90, 6560 x 3 cols - £1584.30, 6570 x 3 cols - £1586.70, 6580 x 3 cols - £1589.10, 6590 x 3 cols - £1591.50, 6600 x 3 cols - £1593.90, 6610 x 3 cols - £1596.30, 6620 x 3 cols - £1598.70, 6630 x 3 cols - £1601.10, 6640 x 3 cols - £1603.50, 6650 x 3 cols - £1605.90, 666



# Sometimes it's hard to tell the Goodies from the Baddies in this industry!

The Computer industry has more than its fair share of quick-quick cowboys. Outfits who are full of precious little talents. Software consultancies that promise you the cream of mind-stretching but send you on a series of mindless routine treks. Companies that are going nowhere fast.

The snag is, it's so often darned hard to tell the goodies from the baddies. So, in case you think you are another of those so called cowboy outfits, just follow our trail of success.

Space communications and ——— Branded 'TOP SECRET'  
Satellite tracking systems  
Complex transition conversions — Blue chip clients  
Hotel Management ——— Our own CHAMPS system

Systems design, real-time projects, feasibility studies, hardware/software evaluation — all successfully undertaken by our posse of dedicated professionals. No wonder we have become one of the leading independent software houses in the country. This success has led to rapid expansion and growth. To meet these demands we require further top calibre personnel.

## WANTED

Senior Programmers  
Programmers & Analysts  
Minimum 2 years experience on;  
IBM OS or DOS (COBOL)  
Honeywell Level 6 (Screenwrite)  
ICL 2900 VME/B (COBOL)  
CICS or IMS database

## REWARDS

up to £12,000  
Equity sharing  
Life assurance  
Medical insurance  
Profit participation  
Career progression  
Job satisfaction

Any Voice and Data Communications Analysts should also join the Marcol posse and see why our home spun philosophy has attracted the support and loyalty of the top trail-blazers. Isn't it time to hitch your wagon to a winner and join up with us?

Phone now or write to:  
Penny Bailey  
Marcol Computer Services Ltd  
60 Queens Gardens, London W2  
Tel: 01-402 9355 (24 hour service)



**MARCOL**  
Communication and Information





# Move into Software Development

## Salary to £12,000 per annum

Our Client is a major computer manufacturer in the process of further expanding its research and development facility in an attractive provincial location to the North of London.

Among the more important projects scheduled for development during 1981/2 is the design and implementation of a Data Dictionary package.

The ideal candidate will have around five years experience in commercial dp, having practical involvement in Database and possibly transaction processing systems. Experience within a database administration team would be an advantage as would an awareness of both structured design and programming and an interest in systems software.

Our Client's policy is one of maintaining close contact with the needs of the commercial User. It must be stressed that we are seeking someone with extensive commercial experience, probably a COBOL User, who has made a conscious decision to become more deeply involved in systems programming and is seeking a future in the development of software bearing relevance to the general needs of the User environment.

The attractive salary offered reflects the importance of the position within its development team and prospects for advancement exist for outstanding applicants.

Superb conditions of employment are available including free BUPA membership, a contributory pension scheme, a staff share purchase plan and a full relocation package.

To obtain further details, contact our Advising Consultant, Ian Payne on 021-236 3781 (24 hour answering service) or 0827 282480 (evenings and weekends).



Specialist Computer Recruitment Ltd

London 01-835 0871 3 Mandeville Place, Wigmote Street, London W1M 5LB  
Birmingham 021-236 3781 35-37 Great Charles Street, Queensway, Birmingham B3 3JY  
Manchester 061-833 0427 Blackfriars House, The Parsonage, Manchester M3 2JA  
Brussels 010 322-640 7161/71 Avenue à Louisa 327, Boite 4, 1050 Bruxelles

SCRL  
Computing  
Services  
Recruitment  
(4156)

## ABU DHABI NATIONAL OIL COMPANY

### OPPORTUNITIES FOR DATA PROCESSING PROFESSIONALS

Abu Dhabi National Oil Company, is one of the major national oil companies in the Middle East, controlling the exploration, production and distribution of oil, gas and associated products. Our Data Processing Services (DPS) Directorate has installed two large ICL 2900 Computers together with Network facilities to support the needs of more than ten Companies within the Group. DPS has developed/acquired computer systems for business applications in the areas of inventory, marketing, personnel, finance and order processing. For scientific applications, applications cover all the major areas of exploration, production, process engineering, and well history data base. Our plans are ambitious and our resources are impressive. We need to complement our existing D.P. Team with additional Computer Professionals who will be engaged in a wide range of activities.

#### WE OFFER:

- \* Involvement with the latest Hardware and Software Techniques.
- \* Attractive and competitive salaries and benefits.
- \* Furnished family accommodation.

#### WE REQUIRE:

- \* Relevant academic background and professional experience.
- \* Dedicated and result oriented people.
- \* ICL equipment.
- \* ICL 2900 Software (VME/B) and products.
- \* Data base techniques (IDMS and DDS).
- \* Transaction processing.

#### SENIOR SYSTEM ANALYST:

The candidate should have a B.Sc. in Computer Science or equivalent with six years' experience in System Analysis.

#### SYSTEM ANALYST:

The candidate should have a B.Sc. in Computer Science or equivalent with four years' experience in Systems Analysis and Programming.

#### ANALYST/PROGRAMMER:

The candidate should have a B.Sc. in Computer Science or equivalent with three years' experience in Data Processing including one year in Systems Analysis. Good knowledge of Cobol.

#### PROGRAMMER:

The candidate should have a B.Sc. in Computer Science or equivalent with two years' experience in Programming and Data Processing. Good knowledge of Cobol.

Interested candidates are invited to forward their applications (together with photocopies of their education and experience certificates) within two weeks from the date hereof to:

PERSONNEL DIRECTORATE - (EMPLOYMENT DIVISION) - ABU DHABI NATIONAL OIL COMPANY - (ADNOC), P.O. BOX 888, ABU DHABI, U.A.E.

## Salesmen

### Mini Computer Systems

We are searching for young and successful entrepreneurial salesmen with experience of selling mini computer systems to commercial OEM outlets.

Our client, a very rapidly growing company with substantial backing from a major group, produces a range of computer peripherals based on DEC\* architecture. Working as part of a small team, the new salesmen will be expected to develop the high potential of the product range concentrating specifically on systems houses in market areas such as insurance, banking, inventory control and medical practices.

The person specification calls for someone who can open doors and make profitable sales as well as being an ambassador for a company with

a well known name.

We will, in particular, be looking for an understanding of both the Hardware and Software of DEC\* based systems. Candidates therefore must have a knowledge of either the RT11 or the CTS 300, 500 operating systems and be familiar with DIBOL and COBOL languages.

The location of this appointment is in Surrey and the remuneration package will consist of a good basic salary plus a realistic sales-related bonus, as well as a two litre car.

To apply, either phone for an application form or send a Curriculum Vitae to the address below. Please quote reference S/MC. These positions are open to both men and women.



\*Registered trade mark of Digital Equipment Corporation

### Cambridge Recruitment Consultants

1a Rose Crescent, Cambridge CB2 3LJ. Telephone 0223 311316

(4130)

### Leicester Polytechnic

#### COMPUTER CENTRE

#### SYSTEM SUPPORT

#### PROJECT LEADER

#### (Systems)

£8235 - £9150

Opportunity for a suitably experienced applicant to take responsibility for a small team supporting system software on a Burroughs Large System.

#### USER SUPPORT

#### PROJECT LEADER

#### (Applications)

£8235 - £9150

Challenging posts for suitably experienced applicants capable of leading projects related either to faculty or administrative support.

Proposals are being formulated for new projects relating to a campus network and database implementation. The experience offered should prove rewarding to the right candidates.

Application forms and further particulars available from Staffing Officer, Leicester Polytechnic, P.O. Box 143, Leicester LE1 8BH. Tel (0533) 851851 Ext. 2303/1.

The above positions are open to men and women.

### Senior Analyst

Salary: £8,474 - £8,883 p.a.

The Authority is looking for an experienced Senior Analyst who has a relevant qualification of degree standard and preferably at least 3 years' experience in computer systems analysis.

Applications will also be considered from suitable people with less experience for appointment at the lower end of the pay range.

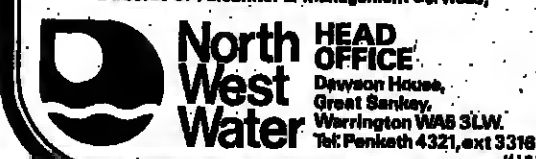
You will be helping to design systems to enable the Authority to carry out its functions covering the whole water cycle. You will be based in a new purpose built computer centre situated at the Authority's head office near Warrington, with a dual I.C.L. 2972 computer supporting an extensive communications network to divisional offices.

There is an evergrowing demand for computer assistance and the development of this network and associated applications, using variety of terminals, is under constant review.

Closing date for applications: 6th February 1981.

The above post is open to men and women.

Application forms available from the Director of Personnel & Management Services.



Athrofa Gogledd-dd Cymru  
The North E Wales Institute  
of higher education

#### SCHOOL OF MATHEMATICS, STATISTICS AND COMPUTING

Kalesterton College  
Connaught Quay, Chwyd

#### PRINCIPAL LECTURER

#### COMPUTING

Applications are invited for the above vacancy. The work will include responsibility for developing a course for a degree in applied computing at degree level.

#### LECTURER in COMPUTING

SALARY: £6683-£9065

Applications are invited from suitably qualified and experienced persons for the post of Lecturer in Computing. The successful applicant will be expected to contribute to the development of the well-equipped Microcomputer Centre.

Further details and application forms are available from the Institute Registrar, The Centre House, Connaught Quay, Chwyd, Connaught Quay, Chwyd. Closing date for receipt of applications: 1st February 1981.

#### BOX Nos.

Box number required should be addressed to:

Box 17, Computer Centre, North West Water, Warrington, Cheshire WA9 6JW. Tel 0925 311316.

## Senior Systems Analysts and Business Analysts.

### Outstanding rewards and career prospects in sunny South Africa.

South Africa's largest publicly owned, fastest growing Life Assurance and Investment Group, with strong international associations, offers outstanding conditions for these new positions, based in Johannesburg.

- \* High salary; comprehensive fringe benefits including low initial mortgage and significantly lower cost of living.
- \* Paid air-fare, initial accommodation and generous relocation allowance for yourself and your family.
- \* You can choose a permanent position or four year renewable contract with very attractive conclusion arrangements.

#### Senior Systems Analysts (ref 100/822/CW)

To lead a team of up to 5 on the technological side of projects. Age 26-40; achievement oriented with management potential and 7+ years D.P. in Commerce/Finance.

#### Business Analysts (ref 100/822/CW)

To interface between DP and users in systems development. Proven DP/admin experience in finance/commerce essential. Life assurance experience and actuarial or accountancy background are advantageous. The company's advanced and constantly updated high technology environment includes two IBM 370/158's with a select systems development team of 240; working closely with top management; converting to and installing Adabas DB System; building on-line Real Time New Business Administration System; Branch sales support via 'Silent 700' terminals.

Their continued success and rapid expansion in a prosperous country with a superb climate means that the opportunities for personal progress are exceptionally good, including the potential to move into management.

Our Client will be conducting final interviews in the UK during the first week in March.

Please telephone or write to Irving Gordon with personal and experience details quoting appropriate ref no.

IPG Technical Recruitment Ltd.  
4000 House 25-28 Old Portland Road, London W14 6JL Tel 01-837 0212 (4 lines)  
Professionals in Selection & Search









**JBA****Consultants****London/Midlands** **Neg. from £12,000**

This prestigious Consultancy Organisation is in the process of recruiting top class DP professionals to work on various commercial and production control projects. Candidates must be aged between 25-35, ideally possess a degree or professional qualification and be used to working independently. They need technically accomplished individuals who have a thorough appreciation of both mini/mainframe equipment coupled with sound experience of systems design through to implementation. An excellent salary is supplemented by attractive fringe benefits (car, BUPA etc) and the opportunity to travel throughout the U.K.

Contact: Isobel Bruce

**Project Leader****Paris Suburbs** **c. £160,000 FF**

We have been retained by a well established commercial organisation to recruit a Project Leader to take responsibility for the development of new mini/micro-based systems. Candidates, who should be French and have a good command of English, must be able to demonstrate several years of successful project management. The ability to motivate technical staff and deal effectively with user management is more important than deep computer knowledge. We are really looking for a mature individual with a good degree from a recognised French University and an outgoing personality to deal with staff at all levels. Excellent salary and career prospects.

Contact: Jim Baker

**Software Manager****London** **£10,000**

This is a good opportunity to join a well established microcomputer manufacturer who cover a variety of end-users and OEM customers throughout the U.K. and overseas. Systems run on a version of the CP/M operating system, and support BASIC, FORTRAN and COBOL with a growing range of other system software. Applications are commercial, scientific and data communications. Background must consist of sound knowledge of hardware/software with emphasis on microcomputer software.

Contact: Janet Chilvers

**HP3000 Software Specialist****London** **neg. to £10,000**

SCICON has an unsurpassed reputation for its technical ability and expertise in the development of advanced systems and software. To meet the demand for efficient and versatile systems they now require an experienced Hewlett Packard software technician to provide system support to the development teams. Responsibilities will also include the management of in-house machines. To qualify for this position candidates will have at least 2 years practical experience of HP3000 and have an in-depth knowledge of the internals of MPX, IMAGE and QUERY. An appreciation of the hardware structure and the ability to configure systems would be desirable assets. An excellent opportunity to progress in a challenging and professional environment.

Contact: Margaret Stevens

**Senior Programmer****City** **£9,000 +**

Ideal opportunity to join a well established financial organisation who are in the process of installing two DEC 11/70's. To apply, it is essential to have at least two years experience in a DEC environment using BASIC, FORTRAN, COBOL, etc. Also to have good knowledge of financial applications, plus the ability to deal with users and their problems. Promotion prospects are good as this is a new and developing installation.

Contact: Janet Chilvers

**Support Analyst/Programmers****Herts** **c. £9,000 Package**

Due to internal promotions and steady expansion, our Client wishes to recruit experienced Analyst/Programmers on small systems, to undergo intensive product training and then head a project team. Working in the areas of complete turnkey systems, specific software packages and tailor made systems, you will be responsible for assessing client requirements, designing, amending and implementing the desired packages and taking charge of post sales support for your team. A strong commercial systems analysis and programming background on small business systems, plus the ability to co-ordinate and control a project. Some exposure to micro-based systems would be advantageous.

Contact: Brian Postle

**Programmers****Bucks** **up to £9,000**

Our Client, an expanding systems consultancy, are looking for a number of programmers to design and develop specialised software for turnkey and on-line projects. Applicants should have a minimum of one years RPG, COBOL or FORTRAN or any other standard high level language.

Contact: David Hendry

**Analyst/Programmer****South London** **£5,250**

Our Client, a large international organisation who are component makers to the European industry are currently seeking a Analyst/Programmer and so have a requirement for an experienced Analyst/Programmer. Candidates should have a sound knowledge of FORTRAN with some exposure to ASSEMBLY, and be able to handle a variety of IBM and non-IBM hardware. Some knowledge of procedures would be an advantage.

Contact: David Hendry

**JAMES BAKER ASSOCIATES**  
International Personnel Consultants  
32 Savile Row, London W1  
Tel: 01-439 9311

**TECHNICAL MARKETING ANALYST****Circa £10,000 p.a. + Company Car**

MODULAR COMPUTER SERVICES is a European leader in the supply of computer systems to the communications and industrial market places.

We are a young dynamic Company with a rapidly expanding marketing organisation and as part of this expansion we are looking for a TECHNICAL MARKETING ANALYST to join our existing team in our U.K. Headquarters in Coventry.

Suitable candidates will have a technical background on minis and will probably have held senior positions in projects implementing real-time systems in industrial or communications applications. The right person will be an enthusiastic committed individual capable of providing our sales force with comprehensive technical support. This role may suit a software specialist with both Assembly experience and proficiency in a high level technical language who is looking for the challenge of a demanding pre-sales environment.

This position carries attractive Company benefits including a non-contributory pension scheme, free life assurance and free BUPA.

For further details or an application form ring SUE HAMPSON on Wokingham 788711 or write to MODCOMP, Molly Millers Lane, Wokingham, Berks.

(4127)

**MODCOMP****SYSTEMS ANALYSTS****£6500 to £10500****PROGRAMMERS £5500 to £8500**

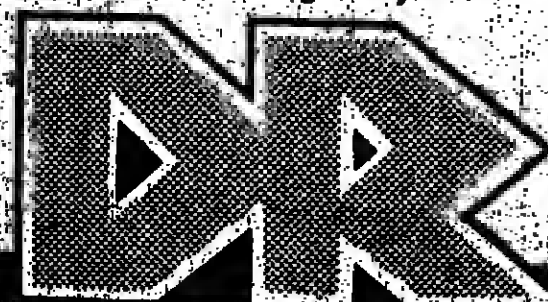
Contact: North and Midlands  
**CATHY SCOTT**

Telephone: 0423 55311

Contact: Scotland  
**IRENE WEBSTER**

Telephone: 041-226 4912

"We know where the good jobs are!"

**DATA RESOURCES AGENCY**

Head Office: P.O. Box 63, 8th Floor, Copthall Tower House, Harrogate HG1 1TS  
Tel: (0423) 55311/2  
Central Offices: 11 Bothwell Street, Glasgow G2 6LY Tel: (041) 226 4912  
(24 HOUR ANSWERING SERVICE 0423-55311/3)

**OPPORTUNITIES—NORTH EAST ENGLAND****SYSTEMS PROGRAMMER****to £8500**

A major IBM user with an ambitious systems development plan wishes to recruit an additional Systems Programmer. The appointment is part of a small, but highly motivated technical support group who are responsible for all software support within the organisation. Experience is required of SOME of the following IBM software which is in use within the department:

• CICS • OS/VS1 • NCP  
• DL/1 • MVS • VTAM

The successful candidate would be offered a salary commensurate with his experience and our client will pay a full relocation package if appropriate.

To apply and find out more details contact Ivor Norton quoting reference CW/8102 at the Harrogate address.

**NETWORK SUPERVISOR****to £8500**

A large scale computer user, in the early stages of establishing a major nationwide network linking the data centre to Group subsidiary companies, wishes to recruit a Network Supervisor. This position carries the following responsibilities for the network:

• planning • equipment • costing  
• configuring • evaluation • general technical back-up  
• scheduling

Candidates must have an operations/hardware background. Previous experience in planning, establishing and supporting a significant network is essential for this key position. Excellent salary and comprehensive relocation package available to the successful candidate.

Interested? Contact Ivor Norton quoting reference CW/8101 at the Harrogate address.

**Ivor Norton Management Services Ltd**

RECRUITMENT CONSULTING DIVISION

**24 HOUR ANSWERING SERVICE (0423)55311**

LONDON  
52, Shaftesbury Avenue,  
London W1V 7DE  
01 734 8662

HARROGATE  
P.O. Box 63, Copthall Tower House,  
Harrogate HG1 1TS  
Harrogate 86626

GLASGOW  
11 Bothwell Street,  
Glasgow G2 6LY  
041 226 4911

**Somerset****COUNTY TREASURER'S DEPARTMENT****COMPUTER AUDITOR****£8481-£9411**

The Council currently operates an ICL 2868 computer which will be replaced in September 1981 by an ICL 2868. A computer auditor is required following the advancement of the career of the present postholder. Applicants are required to have practical technical experience of computers including a knowledge of programming and systems analysis, must be able to communicate effectively with management at all levels and, ideally, would have an appreciation of accounting or audit disciplines.

The postholder is responsible to the Chief Internal Auditor and is expected to make a major contribution towards the efficiency and effectiveness of the Council's financial control systems including the physical and operational security of the computer installation; the appraisal and development of new applications and enhancement to existing applications; the confidentiality of data and the provision of an information service to assist the audit function in general.

The post is suitable for a computer specialist. Ideally, applicants should have financial experience.

Applications, stating age, experience, education, present employment and the names of two referees, to:  
County Treasurer (Ref. JS/RF), County Hall, Taunton

Prospective applicants wishing to discuss the post should ring Tony Parr on Taunton 74461, Ext. 639.

Closing date: January 30th, 1981

**BOX Nos.**

Box number (please send to)  
addressed to

Box No. 170, Copthall Tower House,  
Harrogate  
Harrogate HG1 1TS

**HEXAGON****PL/1 PROGRAMMERS**

C. London, S.E. and N.W. Home Counties.

**Mk. IV PROGRAMMERS**

Top rates in C. London and Kent. Indefinite Contracts.

**CICS/COBOL PROGRAMMERS**

Also Senior Programmer/Systems Designers, South, Central and W. London, Berkshire.

**BANKING ANALYSTS**

On-line real-time international applications.

**OS/COBOL PROGRAMMERS**

Opportunity to gain IMS Exp. on manufacturing or financial systems. Central and W. Home Counties.

**PDP RSX11 PROGRAMMERS**

Any high level language exp. Kent.

**HP COBOL PROGRAMMERS**

C. London and Beds. R/T airline system.

To discuss these and many other contract opportunities, please call any weekday up to 8 p.m.

**HEXAGON**  
SOMERSET STREET, C85  
Harrogate HG1 1TS

Tel: 01438-3871

**COMPUTER WEEKLY CLASSIFIED**

**DIRECT LINE 01-661 0121**  
the newspaper computer people rely on

**CONTRACT DIVISION****IMS COBOL PROGRAMMERS/ SYSTEMS DESIGNERS**

C. London, Surrey and Kent.

**BUSINESS SYSTEMS ANALYSTS**

Product Order Costing System. W. London and Middx.

**UNIVAC 1100 EXEC 8****CONTROL PROGRAMMERS**

Essex. All Commercial Applications.

**DOS/COBOL PROGRAMMERS**

Central and North London. Prefer VSAM Exp.

**SNR. CICS/PL/1 PROGRAMMERS**

To work on latest 8100 conversational systems.

**HONEYWELL LEVELS 6, 64, 66****COBOL PROGRAMMERS**

Prefer screenwrite or IDS/TDS.

**REDIFON EDITOR PROGS.**

For 3/6 month London Contract.

**DURHAM COUNTY COUNCIL**  
**DARLINGTON COLLEGE OF TECHNOLOGY**  
Principal: R. KELBY, MA(Doxon), MInstP., FRSA

REQUIRED ON 1st MAY OR AS SOON AS POSSIBLE THEREAFTER

**LECTURER GRADE I**

IN COMPUTING, to teach on DEC/TEC, NCC and GCE 'O' and 'A' LEVEL, courses. Experience of computer operations systems and of operating procedures would be an advantage.

SALARY SCALE: £4,655-25,000

Application forms and further particulars (returnable by 20th Feb) may be obtained from the Principal, College of Technology, Chapel and Avenue, Darlington DL3 7BB, on receipt of a stamped, addressed, foolscap envelope.

NCC/81



**If you're on form...  
...fill in this one.**

If you're performing really well in your present job, you'll be keeping your eyes open for something better.  
But being a top performer, you've got better things to do with your time than pore over pages of job ads and make dozens of phone calls.  
So to save time, and to get yourself lined up for some of the best jobs going, just fill in our application form.  
We'll then get back to you fast with details of jobs that are exactly right for you.

**Personal** Please write in ballpoint, using block capitals.  
Surname \_\_\_\_\_ Forenames \_\_\_\_\_ Mr/Ms  
Address \_\_\_\_\_

Tel. Home \_\_\_\_\_ Office (discretion will be used) \_\_\_\_\_  
Age \_\_\_\_\_ Nationality \_\_\_\_\_ Car? \_\_\_\_\_  
Are you prepared to relocate in UK? ☐ Abroad? ☐ (tick box)

**Experience** Place no. of years in box, e.g. IBM 360/370 ☐ 4

#### Machines:

Please specify model.

IBM 360/370 ☐

IBM others (specify) \_\_\_\_\_

ICL 1900/2900 ☐

ICL others (specify) \_\_\_\_\_

Honeywell ☐

Univac ☐

Burroughs ☐

PDP ☐

Other mainframes \_\_\_\_\_

Other mini-computers \_\_\_\_\_

(specify) \_\_\_\_\_

Languages

Cobol ☐

Plan ☐

Assembler ☐

P/L ☐

Fortran ☐

Filetab ☐

RPGII ☐

Auto/easy/user code ☐

Others (specify) \_\_\_\_\_

Operating Systems

DOS ☐

OS ☐

George (specify) \_\_\_\_\_

CICS/HASP/GRASP ☐

DBOMP/MMT/IMS ☐

CMS ☐

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

Others (specify) \_\_\_\_\_

## THORBAR

A DIVISION OF INBUCON MANAGEMENT CONSULTANTS LIMITED

### WEST MIDLANDS TECHNICAL CONSULTANT — CIRCA £7,000 PER ANNUM OPPORTUNITY FOR YOU TO DEVELOP YOUR CAREER IN THE MINI/MICRO COMPUTER FIELD

Inbucon Management Consultants Ltd. are looking for a Technical Consultant to work on a wide variety of projects throughout the U.K. concerned with the design and implementation of Mini/Micro systems.

Ideally the successful candidate will be able to meet most of the following requirements:

1. Minimum of one year's programming experience (ideally BASIC) working with Micros and/or Minis.
2. Experience of working in a Manufacturing environment and some knowledge of Industrial Engineering.
3. An Engineering background, preferably supported by a degree.
4. Aged around 25/30 years.

Founded in 1928, Inbucon is a major International Consultancy employing over 700 Consultants and professional staff providing a comprehensive range of services to Industry, Commerce and Government. There are good opportunities for the right person for self-development and career progression in the Company's expanding Computer Consultancy and Advanced Technology Group.

**PLEASE CALL OR WRITE NOW  
FOR AN EARLY INTERVIEW  
ASSOCIATE DIRECTOR: JIM HEWARD**

INBUCON MANAGEMENT CONSULTANTS LIMITED  
48 Poplar Road, Solihull, West Midlands B91 3AG  
Telephone: 021-705 6414

**INBUCON**

Ref. CW/5/81

## SCHEDULER/ SENIOR OPERATOR

Our Head Office is based at Matlock on the fringe of the Peak District. The Computer Department is equipped with a large ICL 2904 installation operating under George 2+ and MTS.

Scheduling and ancillary functions constitute the major involvement, but operating and some staff training will also be a requirement. It is anticipated that candidates will need at least 4 years' relevant experience. This is a demanding position within a small but very active department.

The position offers an attractive salary together with excellent conditions of employment and working environment.

For an application form or further information please contact:

Miss C. M. Smithers, Personnel Assistant, Tarmac Roadstone (Northern) Limited, John Hadfield House, Dale Road, MATLOCK, Derby.

TELEPHONE: MATLOCK 3486 EXT. 355

**Tarmac**  
ROADSTONE

# MODUS

**International Personnel Consultants**  
Modus Management Services Limited  
148 Watling Street, Radlett, Herts. WD7 7JH  
Telephone: Radlett (09276) 3077

## WE NEED ANALYSTS!

Yes we need real Systems Analysts...People who excel at extracting information from a multitude of users, people who can gain the full confidence of user departments, including senior and operational staff, helping them find out what they want and helping them to decide what they really need. A military system background would help but is not a pre-requisite.

### £10,500-£13,500

Plus benefits package which includes: Bupa, free season ticket loan, relocation expenses, pensions, etc.

### Systems Concepts

Imagine the scope and freedom an Analyst really needs to do his or her job properly. The freedom to encourage users to give information without the restriction of a pre-conceived sizing of the machine or installation or system, the freedom to produce a totally comprehensive requirements specification, the scope that comes naturally from being there to analyse rather than impose a solution, the additional freedom that results from having a first-class team of software and communications designers to back you up. How often have you worked in conditions as ideal as these?

The task our client has set is as comprehensive as these parameters indicate. The decisions to be made from your work will identify not only the detailed aspects of the system design but also the benefits to be derived from a computerised solution, the costs such a project would incur and the time-scale for implementation.

What is certain is that the system will be multi-user and multi-locational and that the most up-to-date technology will have to be used. The overall objective is an extremely exacting one to achieve!

Interested? Your career may need the kind of boost that working on this system will give. The company you would be working for is recognised world-wide as one of the very best, as well as being one of the largest in the computer industry. Your security and professionalism cannot help but be enhanced.

Contact: Andy Wright or Mike Creamer

### Professional Background

Your experience to date must indicate sound, thorough Analysts — not just design and programming. Most people at this level will have taken responsibility for a substantial system development and we will expect to see some evidence of flair, imagination and self-reliance. A degree or equivalent professional qualification would be a considerable asset, whilst knowledge of such techniques as data analysis, extremely welcome.

In view of the growth factor and the way in which our clients assign staff to project work, there is no doubt that there will be progressively more room for extremely senior consultancy and project management positions as time passes. Additionally, our client's approach to project control and system design is entirely modern and exposure to these methodologies is certain to enhance and increase individual professional capabilities.

Opportunities exist within, or heading-up, the various design teams and the positions would suit applicants who are already at Senior Analyst level.

*DI 1 on 1 top*

### IMMEDIATE SALES OPPORTUNITIES

with  
manufacturers of:

- Data collection and communications systems. O.Q.E. £18+ Mid and North.
- Minicomputers, major A/L Sales. O.Q.E. £17+ North.
- Minicomputer systems. Area sales. £20k+, North and Midlands.

Contact immediately, quoting JVA/81



Insight Marketing  
and Personnel  
Consultants Ltd.

Tel: 061  
236 7026

### PROGRAMMER? BECOME A TECHNICAL CONSULTANT LOOK WHAT IT TAKES!

THE PERSON 2-3 years' experience of commercial application programming in DEC BASIC 4, under RSTS/B and the ability to liaise with clients.  
THE JOB Converting functional systems design to computer systems design, implementing, tailoring, made customer systems, and adapting standard packages to users requirements.  
THE REWARD A top salary, a swift and clear promotion path within a respected and established multi-million turnover group based in London but with provincial offices. Big company perks and travel and accommodation allowances when working away, plus many other benefits.

#### COBOL PROGRAMMERS?

#### PROGRESS NOW TO SENIOR PROGRAMMER

THE PERSON 3-5 years' experience of on-line IBM COBOL using VSAM and CICS, the ability to control a team of 3-4 programmers.  
THE JOB Developing a new on-line foreign exchange system for a major bank in the City. An understanding of IBM and the ability to produce first class program specifications is essential.  
THE REWARD £10-11k per annum plus non-contributory pension, life insurance, BUPA, Beneficial mortgage scheme, LTV, bonus and recreational, holiday and sporting facilities.

**YOU KNOW WHAT YOU ARE  
WE KNOW WHAT YOU CAN BECOME**

If you feel you would be a suitable candidate for any of these opportunities, please contact: *John Jackson* Tel: 01-724 9723 (Revenue charges if outside GL) or write to: *Mr J. Jackson* at 117/120.



Vantage Computer Services Ltd.  
15 Roland Street, London W1V 3QQ. Telephone: 01-724 9723

### CALIFORNIA

For the start of '81 we at Independent Software Support can offer many medium- and long-term contracts in America.

#### IBM

COBOL, IMS, CICS

39 PROGRAMMERS

With a minimum of 5 years' D.P. experience with 2-3 years' IMS.

#### ARIZONA

HONEYWELL

15 SYSTEMS PROGRAMMERS

GCOS - GMAP Conversion

With minimum 4 years' GCOS experience.

\* All the positions carry high salaries and a full relocation package.

For more information please get in touch with John at ISS on 01-437 4704 or write to Independent Software Support (ISS) Group, 21-23 St. Andrew Court Road, London, W1P 9AP.



Knight Computer Services Ltd.

01-4914706



# U-C-A

## TWELVE EXCELLENT REASONS FOR UCA NOW!

### ICL Operators

**Surrey** To £7,500 inc.  
If you are an ICL operator with 2 years + 1900 GIII or large 2800 VMEB experience, then ring us now for more details of this vacancy in a picturesque part of Surrey. There is a 3 shift system, and company benefits include CPA, subs, cant., 4 weeks' hols, and S&S club.  
CW 4/1 Simon

### Operators to Ops Supervisor

**W. London** To £5,500  
If you have 14 years + DOS/VS/POWER/CICS experience and are within reach of West London, ring us for more details of the above positions on the new IBM 3900 range. There is a two-shift system and no nights.  
CW 4/2 Simon

### Contract Programmer/Analysts

IBM - 3100 3700 Prog. - Surrey - 3 mths.  
IBM - COBOL 3941 DOS/VSE CICS - London - 3 mths.  
IBM - SYS. 3 DOS/VSE COBOL RPL01 - London - 3 mths.  
IBM 370 COBOL CICS VSAM DOS - London - 3 mths.  
Hwell - LBS TDS IDS COBOL - H'ra - 3 mths.  
T.I. - 990 COBOL T/rom - London - 3 mths + Mini/Micro - Software experience - Austria - 1 year.  
Digital - Telephone Message Switching S/ware - France - 18 mths.  
PHONE/RENE FOR DETAILS CW 4/3

**UCR**

Recruitment Consultants

UNIVERSAL COMPUTER ASSOCIATES LIMITED

01-995 3883 (01-958 6138 Evenings)

Data Express House, 3 Prospect Place, Heathfield Terrace, Chiswick W 4

### IBM Systems Programmers

**London & Home Counties** £8,000 to £11,000  
I bet you never knew how popular you were? All you need to have is a technical IBM background with relevant IBM DOS/VSE or OS/VS1, VS2 or MVS experience to command a very good salary. We now have vacancies in: E. LONDON (1), HANTS (1), CROYDON (1), KENT (2), and the CITY (2). Remember that good applications programmers with the right interest in the systems side would be very welcome. Several companies offer excellent perks including relocation package, subsidised mortgage facilities, etc.  
CW 4/4 Tricia

### Senior Salesmen needed

**London & Home Counties** To £20,000 Q.E. + car  
An established market leader wishes to expand the operation of the mini-micro market by establishing Senior Salesmen to take charge of existing accounts whilst obtaining new business. A real chance to match your efforts with reward and managerial promotion after a reasonable period is well on the cards.  
CW 4/5 Michael

### Sales Support

**London & Home Counties** To £9,000 + car  
We have six MINI computer manufacturing companies with offices around the country who require people with the confidence to deal with clients in a pre- and post-sales situation. All vacancies require a programming background on minis and the jobs will provide an exciting and satisfying career. IBM or other mainframe experience is also an advantage.  
CW 4/5 Michael

### Cobol Programmers

**Surrey** £8,000-+  
A large well-known Utility in N. Surrey requires COBOL programmers (any machine) with 18 months' experience. Here is a chance to gain really first-class training in the very latest while hot IBM computer techniques and improve your career structure to end. Benefits abound, including CPS, subs, canteen, bonus scheme and S&S club, etc.  
CW 4/7 Tricia

### Analyst Programmer

**Berks** £8,000  
If European travel appeals to you, then this is the job you have been looking for. An electronics manufacturing company requires an Analyst Programmer with 4 years' COBOL/BASIC on-line systems experience. A Hewlett-Packard background is an advantage. There will be regular travel to European capitals. Excellent benefits include health scheme, CPS + Life Ass., BUPA discount, subs, rest, and 20 days' hols.  
CW 4/8 Tricia

### Analyst Programmers

**Central London** £8,000-£11,000  
A large international company in Central London requires Analyst Programmers with a minimum of two years' IBM COBOL CICS experience. A Hewlett-Packard background will also be considered for their on-line major application enhancement. This is an excellent firm with a first-rate career structure and perks that include flexitime, free lunches, non-CPS and 4 weeks' holidays.  
CW 4/9 Tricia

### Systems Analyst

**City** £8,000  
A major Telecommunications manufacturing and supply company using the very latest DEC and IBM installations has requirements for a DATA BASE systems analyst with IBM CICS or similar experience. Here is the opportunity to join the market leaders and benefit not only from an excellent career structure but top perks that include flexitime, LVs, relocation assistance, etc.  
CW 4/10 Tricia

### Senior Systems Analysts

**Herts** To £9,000  
This major consumer organisation has been in D.P. for the last 15 years and has developed a very sophisticated Database and Realtime computer network. Their next expansion phase demands two people to work in Stock control which is sales based and a financial online system using their Database. Promotional prospects look good and company perks are excellent.  
CW 4/11 Michael

### Project Leaders & Consultants

**C. London** £9,000 to £18,000  
Now is the time to get in on the ground floor of a large government contract (based around ICL 2800) that will extend your experience and provide a worthwhile step in your career development plans. As part of this international consultancy handling this contract you will be involved in a major project requiring the highest standards of professionalism. All those wanting more details please contact Michael.  
CW 4/12 Michael

## World Leader (based in Thames Valley) Graphics Systems SALES EXECUTIVE to live in the West Country

**NEGOTIABLE PACKAGE includes: High Basic Salary + CAR + BUPA + LIFE ASSURANCE FULL TRAINING**

As part of their 1981 expansion plans, our Client wishes to recruit a Sales Executive with an above average technical bias.

As the acknowledged world leading Manufacturer of graphics systems they enjoy an envied reputation in the industry where their comprehensive product range is backed up by entire teams of hardware and software experts. In short, they make total graphics systems cared for by a second to none worldwide support network.

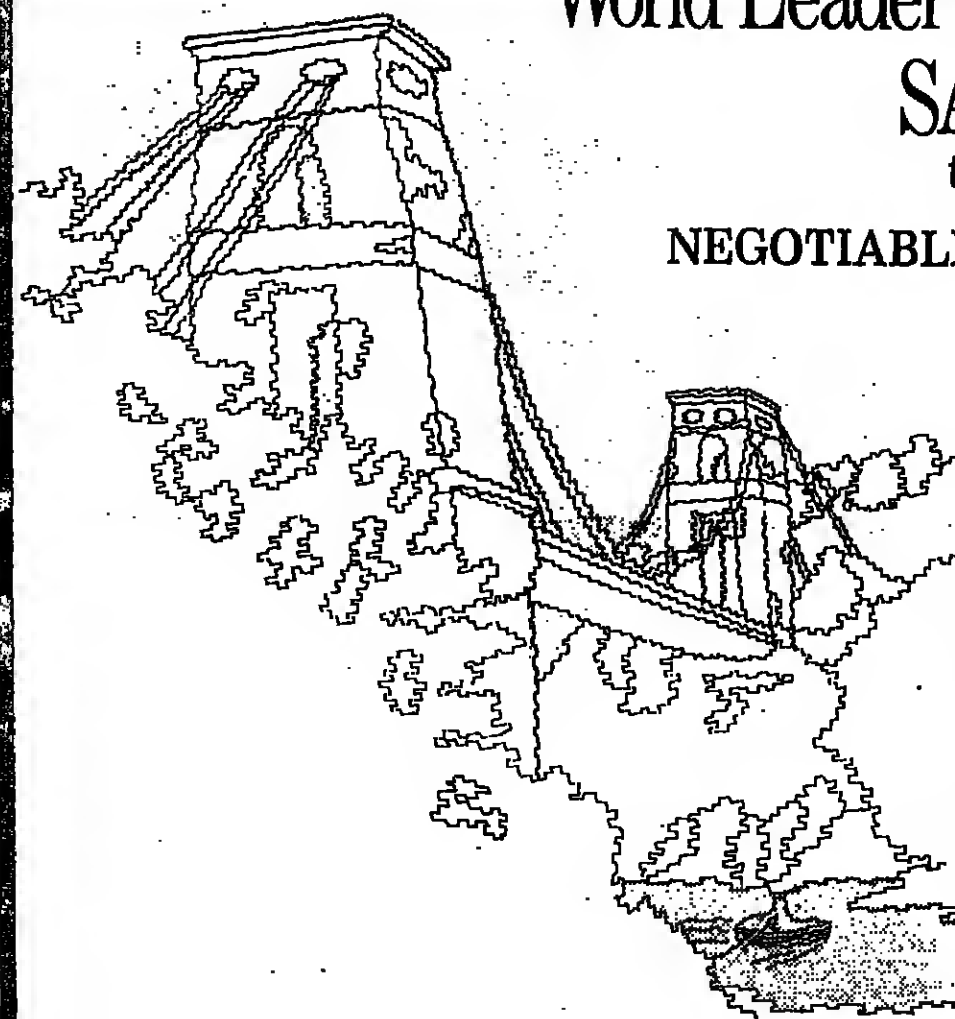
As Sales Executive you will cover the West of England and therefore work from home. Consequently self motivation is important as is the wish to grow yourself and the area. On that point the graphics industry is growing at a rate of 40%!

Apart from a good sales profile it is essential that you have the aptitude to negotiate to the point of sale in, for example, the scientific or engineering sectors.

Opportunities within the Company are genuine and could cover various areas of need. The Company offer structured training to arm you with the tools of success.

If you are looking for an exciting challenge with a world leader where your technical skills will be stretched, contact, SIMON LEVER, ON 021-236 3781 (24 hour answering service) OR 021-420 1574 (evenings & weekends).

If you prefer please send Curriculum Vitae to the Birmingham Office.



**UCR**

Specialist Computer Recruitment Ltd

London 01-935 0871 3 Mendeville Place, Wigmore Street, London W1M 5LB  
Birmingham 021-236 3781 35-37 Great Charles Street, Queensway, Birmingham B3 3JY  
Manchester 061-833 0427 Blackfriars House, The Parsonage, Manchester M3 2JA  
Brussels 010 322-640 7151/71 Avenue Louise 327, Boite 4, 1050 Bruxelles

### SYSTEMS DESIGNERS

**London and Bucks.** To £15,000 plus car  
Our client, a processor in the Computer Services industry, seeks applicants with considerable experience in the design and implementation of computer systems, in particular of on-line systems and preferably with a knowledge of ICL 2800 series computers.

### SENIOR CONSULTANTS

**London** Salary Negotiable  
Fast growing company in the Computer Services industry seeks Senior Consultants who have a wide computer applications experience and are able to deal with clients at all levels of management. Applications from candidates with previous management experience are particularly welcome.

### SYSTEMS ANALYSTS

**Bucks, London and Herts.** To £13,500  
Several of our clients seek experienced analysts with some user definition experience and a background of advising the right information from a variety of people.

### DESIGNERS/IMPLEMENTORS

**London** To £13,500  
Our client, a processor in the Computer Services industry, seeks applicants with a minimum of 3 years' experience in the design and implementation of computer systems, in particular of on-line systems and preferably ICL 2800.

### PROGRAMMERS/PROGRAMMER ANALYSTS

**London, Herts, Bucks, and Middx.** To £11,000  
We would like to hear from candidates with good experience of the following languages: COBOL, PL/I, Pascal, BASIC, ALGOL, FORTRAN, and C. Also experience of the following systems: ICL 2800, ICL 2900, ICL 3900, ICL 4900, ICL 5900, ICL 6900, ICL 7900, ICL 8900, ICL 9900, ICL 10900, ICL 11900, ICL 12900, ICL 13900, ICL 14900, ICL 15900, ICL 16900, ICL 17900, ICL 18900, ICL 19900, ICL 20900, ICL 21900, ICL 22900, ICL 23900, ICL 24900, ICL 25900, ICL 26900, ICL 27900, ICL 28900, ICL 29900, ICL 30900, ICL 31900, ICL 32900, ICL 33900, ICL 34900, ICL 35900, ICL 36900, ICL 37900, ICL 38900, ICL 39900, ICL 40900, ICL 41900, ICL 42900, ICL 43900, ICL 44900, ICL 45900, ICL 46900, ICL 47900, ICL 48900, ICL 49900, ICL 50900, ICL 51900, ICL 52900, ICL 53900, ICL 54900, ICL 55900, ICL 56900, ICL 57900, ICL 58900, ICL 59900, ICL 60900, ICL 61900, ICL 62900, ICL 63900, ICL 64900, ICL 65900, ICL 66900, ICL 67900, ICL 68900, ICL 69900, ICL 70900, ICL 71900, ICL 72900, ICL 73900, ICL 74900, ICL 75900, ICL 76900, ICL 77900, ICL 78900, ICL 79900, ICL 80900, ICL 81900, ICL 82900, ICL 83900, ICL 84900, ICL 85900, ICL 86900, ICL 87900, ICL 88900, ICL 89900, ICL 90900, ICL 91900, ICL 92900, ICL 93900, ICL 94900, ICL 95900, ICL 96900, ICL 97900, ICL 98900, ICL 99900, ICL 100900, ICL 101900, ICL 102900, ICL 103900, ICL 104900, ICL 105900, ICL 106900, ICL 107900, ICL 108900, ICL 109900, ICL 110900, ICL 111900, ICL 112900, ICL 113900, ICL 114900, ICL 115900, ICL 116900, ICL 117900, ICL 118900, ICL 119900, ICL 120900, ICL 121900, ICL 122900, ICL 123900, ICL 124900, ICL 125900, ICL 126900, ICL 127900, ICL 128900, ICL 129900, ICL 130900, ICL 131900, ICL 132900, ICL 133900, ICL 134900, ICL 135900, ICL 136900, ICL 137900, ICL 138900, ICL 139900, ICL 140900, ICL 141900, ICL 142900, ICL 143900, ICL 144900, ICL 145900, ICL 146900, ICL 147900, ICL 148900, ICL 149900, ICL 150900, ICL 151900, ICL 152900, ICL 153900, ICL 154900, ICL 155900, ICL 156900, ICL 157900, ICL 158900, ICL 159900, ICL 160900, ICL 161900, ICL 162900, ICL 163900, ICL 164900, ICL 165900, ICL 166900, ICL 167900, ICL 168900, ICL 169900, ICL 170900, ICL 171900, ICL 172900, ICL 173900, ICL 174900, ICL 175900, ICL 176900, ICL 177900, ICL 178900, ICL 179900, ICL 180900, ICL 181900, ICL 182900, ICL 183900, ICL 184900, ICL 185900, ICL 186900, ICL 187900, ICL 188900, ICL 189900, ICL 190900, ICL 191900, ICL 192900, ICL 193900, ICL 194900, ICL 195900, ICL 196900, ICL 197900, ICL 198900, ICL 199900, ICL 200900, ICL 201900, ICL 202900, ICL 203900, ICL 204900, ICL 205900, ICL 206900, ICL 207900, ICL 208900, ICL 209900, ICL 210900, ICL 211900, ICL 212900, ICL 213900, ICL 214900, ICL 215900, ICL 216900, ICL 217900, ICL 218900, ICL 219900, ICL 220900, ICL 221900, ICL 222900, ICL 223900, ICL 224900, ICL 225900, ICL 226900, ICL 227900, ICL 228900, ICL 229900, ICL 230900, ICL 231900, ICL 232900, ICL 233900, ICL 234900, ICL 235900, ICL 236900, ICL 237900, ICL 238900, ICL 239900, ICL 240900, ICL 241900, ICL 242900, ICL 243900, ICL 244900, ICL 245900, ICL 246900, ICL 247900, ICL 248900, ICL 249900, ICL 250900, ICL 251900, ICL 252900, ICL 253900, ICL 254900, ICL 255900, ICL 256900, ICL 257900, ICL 258900, ICL 259900, ICL 260900, ICL 261900, ICL 262900, ICL 263900, ICL 264900, ICL 265900, ICL 266900, ICL 267900, ICL 268900, ICL 269900, ICL 270900, ICL 271900, ICL 272900, ICL 273900, ICL 274900, ICL 275900, ICL 276900, ICL 277900, ICL 278900, ICL 279900, ICL 280900, ICL 281900, ICL 282900, ICL 283900, ICL 284900, ICL 285900, ICL 286900, ICL 287900, ICL 288900, ICL 289900, ICL 290900, ICL 291900, ICL 292900, ICL 293900, ICL 294900, ICL 295900, ICL 296900, ICL 297900, ICL 298900, ICL 299900, ICL 300900, ICL 301900, ICL 302900, ICL 303900, ICL 304900, ICL 305900, ICL 306900, ICL 307900, ICL 308900, ICL 309900, ICL 310900, ICL 311900, ICL 312900, ICL 313900, ICL 314900, ICL 315900, ICL 316900, ICL 317900, ICL 318900, ICL 319900, ICL 320900, ICL 321900, ICL 322900, ICL 323900, ICL 324900, ICL 325900, ICL 326900, ICL 327900, ICL 328900, ICL 329900, ICL 330900, ICL 331900, ICL 332900, ICL 333900, ICL 334900, ICL 335900, ICL 336900, ICL 337900, ICL 338900, ICL 339900, ICL 340900, ICL 341900, ICL 342900, ICL 343900, ICL 344900, ICL 345900, ICL 346900, ICL 347900, ICL 348900, ICL 349900, ICL 350900, ICL 351900, ICL 352900, ICL 353900, ICL 354900, ICL 355900, ICL 356900, ICL 357900, ICL 358900, ICL 359900, ICL 360900, ICL 361900, ICL 362900, ICL 363900, ICL 364900, ICL 365900, ICL 366900, ICL 367900, ICL 368900, ICL 369900, ICL 370900, ICL 371900, ICL 372900, ICL 373900, ICL 374900, ICL 375900, ICL 376900, ICL 377900, ICL 378900, ICL 379900, ICL 380900, ICL 381900, ICL 382900, ICL 383900, ICL 384900, ICL 385900, ICL 386900, ICL 387900, ICL 388900, ICL 389900, ICL 390900, ICL 391900, ICL 392900, ICL 393900, ICL 394900, ICL 395900, ICL 396900, ICL 397900, ICL 398900, ICL 399900, ICL 400900, ICL 401900, ICL 402900, ICL 403900, ICL 404900, ICL 405900, ICL 406900, ICL 407900, ICL 408900, ICL 409900, ICL 410900, ICL 411900, ICL 412900, ICL 413900, ICL 414900, ICL 415900, ICL 416900, ICL 417900, ICL 418900, ICL 419900, ICL 420900, ICL 421900, ICL 422900, ICL 423900, ICL 424900, ICL 425900, ICL 426900, ICL 427900, ICL 428900, ICL 429900, ICL 430900, ICL 431900, ICL 432900, ICL 433900, ICL 434900, ICL 435900, ICL 436900, ICL 437900, ICL 438900, ICL 439900, ICL 440900, ICL 441900, ICL 442900, ICL 443900, ICL 444900, ICL 445900, ICL 446900, ICL 447900, ICL 448900, ICL 449900, ICL 450900, ICL 451900, ICL 452900, ICL 453900, ICL 454900, ICL 455900, ICL 456900, ICL 457900, ICL 458900, ICL 459900, ICL 460900, ICL 461900, ICL 462900, ICL 463900, ICL 464900, ICL 465900, ICL 466900, ICL 467900, ICL 468900, ICL 469900, ICL 470900, ICL 471900, ICL 472900, ICL 473900, ICL 474900, ICL 475900, ICL 476900, ICL 477900, ICL 478900, ICL 479900, ICL 480900, ICL 481900, ICL 482900, ICL 483900, ICL 484900, ICL 485900, ICL 486900, ICL 487900, ICL 488900, ICL 489900, ICL 490900, ICL 491900, ICL 492900, ICL 493900, ICL 494900, ICL 495900, ICL 496900, ICL 497900, ICL 498900, ICL 499900, ICL 500900, ICL 501900, ICL 502900, ICL 503900, ICL 504900, ICL 505900, ICL 506900, ICL 507900, ICL 508900, ICL 509900, ICL 510900, ICL 511900, ICL 512900, ICL 513900, ICL 514900, ICL 515900, ICL 516900, ICL 517900, ICL 518900, ICL 519900, ICL 520900, ICL 521900, ICL 522900, ICL 523900, ICL 524900, ICL 525900, ICL 526900, ICL 527900, ICL 528900, ICL 529900, ICL 530900, ICL 531900, ICL 532900, ICL 533900, ICL 534900, ICL 535900, ICL 536900, ICL 537900, ICL 538900, ICL 539900, ICL 540900, ICL 541900, ICL 542900, ICL 543900, ICL 544900, ICL 545900, ICL 546900, ICL 547900, ICL 548900, ICL 549900, ICL 550900, ICL 551900, ICL 552900, ICL 553900, ICL 554900, ICL 555900, ICL 556900, ICL 557900, ICL 558900, ICL 559900, ICL 560900, ICL 561900, ICL 562900, ICL 563900, ICL 564900, ICL 565900, ICL 566900, ICL 567900, ICL 568900, ICL 569900, ICL 570900, ICL 571900, ICL 572900, ICL 573900, ICL 574900, ICL 575900, ICL 576900, ICL 577900, ICL 578900, ICL 579900, ICL 580900, ICL 581900, ICL 582900, ICL 583900, ICL 584900, ICL 585900, ICL 586900, ICL 587900, ICL 588900, ICL 589900, ICL 590900, ICL 591900, ICL 592900, ICL 593900, ICL 594900, ICL 595900, ICL 596900, ICL 597900, ICL 598900, ICL 599900, ICL 600900, ICL 601900, ICL 602900, ICL 603900, ICL 604900, ICL 605900, ICL 606900, ICL 607900, ICL 608900, ICL 609900, ICL 610900, ICL 611900, ICL 612900, ICL 613900, ICL 614900, ICL 615900, ICL 616900, ICL 617900, ICL 618900, ICL 619900, ICL 620900, ICL 621900, ICL 622900, ICL 623900, ICL 624900, ICL 625900, ICL 626900, ICL 627900, ICL 628900, ICL 629900, ICL 630900, ICL 631900, ICL 632900, ICL 633900, ICL 634900, ICL 635900, ICL 636900, ICL 637900, ICL 638900, ICL 639900, ICL 640900, ICL 641900, ICL 642900, ICL 643900, ICL 644900, ICL 645900, ICL 646900, ICL 647900, ICL 648900, ICL 649900, ICL 650900, ICL 651900, ICL 652900, ICL 653900, ICL 654900, ICL 655900, ICL 656900, ICL 657900, ICL 658900, ICL 659900, ICL 660900, ICL 661900, ICL 662900, ICL 663900, ICL 664900, ICL 665900, ICL 666900, ICL 667900, ICL 668900, ICL 669900, ICL 670900, ICL 671900, ICL 672900, ICL 673900, ICL 674900, ICL 675900, ICL 676900, ICL 677900, ICL 678900, ICL 679900, ICL 680900, ICL 681900, ICL 682900, ICL 683900, ICL 684900, ICL 685900, ICL 686900, ICL 687900, ICL 688900, ICL 689900, ICL 690900, ICL 691900, ICL 692900, ICL 693900, ICL 694900, ICL 695900, ICL 696900, ICL 697900, ICL 698900, ICL 699900, ICL 700900, ICL 701900, ICL 702900, ICL 703900, ICL 704900, ICL 705900, ICL 706900, ICL 707900, ICL 708900, ICL 709900, ICL 710900, ICL 711900, ICL 712900, ICL 713900, ICL 714900, ICL 715900, ICL 716900, ICL 717900, ICL 718900, ICL 719900, ICL 720900, ICL 721900, ICL 722900, ICL 723900, ICL 724900, ICL 725900, ICL 726900, ICL 727900, ICL 728900, ICL 729900, ICL 730900, ICL 731900, ICL 732900, ICL 733900, ICL 734900, ICL 735900, ICL 736900, ICL 737900, ICL 738900, ICL 739900, ICL 740900, ICL 741900, ICL 742900, ICL 743900, ICL 744900, ICL 745900, ICL 746900, ICL 747900, ICL 748900, ICL 749900, ICL 750900, ICL 751900, ICL 752900, ICL 753900, ICL 754900, ICL 755900, ICL 756900, ICL 757900, ICL 758900, ICL 759900, ICL 760900, ICL 761900, ICL 762900, ICL 763900, ICL 764900, ICL 765900, ICL 766900, ICL 767900, ICL 768900, ICL 769900, ICL 770900, ICL 771900, ICL 772900, ICL 773900, ICL 774900, ICL 775900, ICL 776900, ICL 777900, ICL 778900, ICL 779900, ICL 780900, ICL 781900, ICL 782900, ICL 783900, ICL 784900, ICL 785900, ICL 786900, ICL 787900, ICL 788900, ICL 789900, ICL 790900, ICL 791900, ICL 792900, ICL 793900, ICL 794900, ICL 795900, ICL 796900, ICL 797900, ICL 798900, ICL 799900, ICL 800900, ICL 801900, ICL 802900, ICL 803900, ICL



## SALES EXECUTIVE

London Area

c. £16,000+

Mouncey and Partners, one of the longest-established Consultancy Software Houses, are expanding their current sales team.

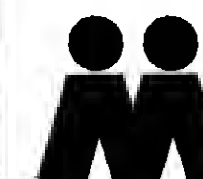
We are looking for a professional salesperson with the following qualifications to sell our various consultancy and development services.

- A proven sales record for several years
- Currently selling in the software/bureau industry
- Ideally selling in the London/Home Counties areas
- Aged between 25-35 years with a positive and self-motivating attitude
- Enjoys selling and developing client relationships

Earnings will include a high salary and commission amounting to at least £16,000 p.a. on target sales, plus the following:

- Company car and expenses
- Normal benefits including pension, B.U.P.A., etc.

Interested? Then contact Alan Fenn on 01-486 7777 or write to him at



Mouncey & Partners Limited  
13/14 Cornwell Terrace  
Regent's Park  
London, N.W.1

## DALROTH computer and partners personnel

### COMMUNICATIONS

Major Real Time/On Line Projects  
London - Home Counties - Midlands

A leading International Consultancy Organisation currently wishes to recruit a large number of personnel for 4 major Real Time and On Line projects. Hardware includes large IBM, ICL and Honeywell mainframes, DEC, DG, Tandem, GEC minis plus various Micro Systems. Applications include Command and Control, Military Information Systems and a major commercial system with a large terminal network and Database facilities.

Project phases include Study, Definition, Design and subsequent stages through to operational running.

The following personnel are required:

Project Managers	-	To c. £18,000 + Car
Senior Consultants	-	£13,000 - £15,000 + Car
Systems Designers	-	£10,000 - £15,000 + Car
Consultants	-	£11,000 - £13,000
Systems Analysts	-	£ 8,000 - £12,000
Systems Programmers	-	£ 9,500 - £12,000
Programmers	-	£ 8,000 - £11,500

For all appointments, experience on large-scale communications oriented projects would be highly desirable, especially at the more senior levels. Specific areas of experience could include:

- \* Networks - Traffic - Work Load
- \* Message Switching - Interfacing
- \* Voice Networks - Electronic Mail
- \* Security & Access Control
- \* Military Command & Control
- \* Total Systems Design
- \* Database - Data Analysis
- \* DBMS/IMS
- \* Financial - Accounting - Auditing
- \* Control & Quality Assurance
- \* Large ICL/IBM or Mini/Micro

All appointments offer excellent long-term career prospects with opportunities for travel both in the UK and overseas. Attractive remuneration packages will be negotiated on an individual basis.

Urgent: MVS Systems Programmer for Germany to start 1/3/81 - £450+

For further details, please contact: Ian Murray West or Roger Allington on 01-486 2847 (office hours) or Milton Keynes (0908) 663415/Berkhamstead (04427) 2289 (evening/weekends).

Quote reference number 9841

DALROTH & PARTNERS LIMITED, 4 HALF MOON STREET, LONDON W1Y 7RA

# E.P.O.S. - the power to revolutionise retailing

Not since the advent of self-service has there been proposed such a major development in retailing philosophy as Electronic Point of Sale. It will provide on-line monitoring and recording of goods inward, customer checkouts, stock control, accounting, merchandising, staff training, in fact everything to increase the efficiency of our stores.

To start with, in the first year, 15 major Tesco stores will each be equipped with:

laser scanners  
micro-processor driven terminal registers  
terminal controllers  
linked to in-store IBM 8100's  
all linked to IBM mainframe at our Cheshunt Data Centre

Think about the career prospects of being one of the first to put in the groundwork on this exciting new project.

Tesco/EPOS could ultimately be the largest, most complex system of its kind in Europe. It will revolutionise both retailing practice and data processing techniques and your contribution to the team that sets it up and keeps it running could be vital... to EPOS and your future.

## Senior Programmers

up to £10,300 p.a.

## Data Base Analysts

up to £13,700 p.a.

## Systems Assurance

## Project Leader

up to £13,600 p.a.

## Senior

## Systems Analysts

up to £11,600 p.a.

## Systems

## Programmers

up to £13,700 p.a.

## Network Analyst

up to £11,700 p.a.

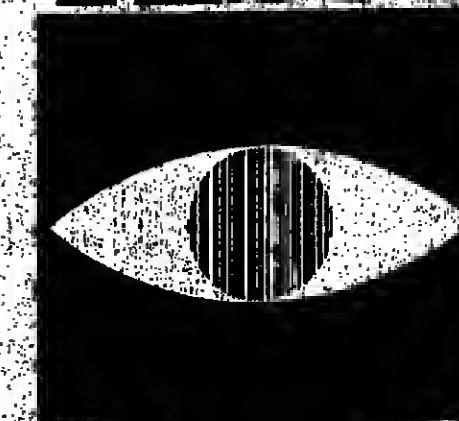
Salaries commensurate with experience

If you have experience with any of the following: IBM Cobol, Assembler, SPPS 2, PLDS, IMS, DPPX, TSO, SPF, MVS, NCF, MSP, DATAMANAGER, and are our sort of person, we can here and now offer you real career advancement.

There's big-company prospects to go with big-company salaries plus contributory pension and private medical schemes. Other benefits include relocation expenses where appropriate, subsidised staff restaurant and an active sports and social club.

Take your first step right now, contact: Barry Howden, Personnel Department, Tesco Stores Limited, Tesco House, De La Mare Road, Cheshunt, Herts EN8 9SL. Tel: Waltham Cross 32222

# TESCO



Putting EPOS into action



A user dept with its own IBM 3033's?

And paying salaries up to £20,000 p.a. after tax?

The answers are definitely yes; and what's more, they will have their own purpose built computer centre ready for occupation towards the end of this year.

The machines will be dedicated to the Petroleum Exploration Division, which signifies the importance of this area of our client's activities.

As one of the largest companies in the world, you can be assured of excellent career and financial rewards.

During early 1981 we will be looking for the following:

## Systems Programmers Capacity Planners Data Base Specialists

There will be many other job opportunities during 1981

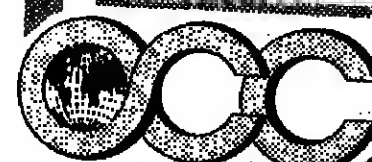
All people applying should possess a degree or similar qualification, have extensive experience of large IBM systems and be prepared to take up employment in Saudi Arabia.

The package could include:

- An attractive after-tax salary • Free medical care
- Substantial accommodation • Prospects of family status for the more senior positions.

Informal interviews are being held NOW and client interviews will take place at the end of February.

Your first step towards a brighter '81 is to contact Mika Mead at OCC Computer Personnel, 16 Bedford Row, London WC1R 4EB or telephone 01-242 9356.



**occ computer personnel**  
01-242 9356 24 hour answerservice

16 Bedford Row London WC1R 4EB. Telex 24224 ref. 1163  
Specialists since 1971 in UK and international computer and technical appointments.  
Please contact us for assistance and guidance with your next change.

1112

## OPERATIONS CONTROLLER

- \* IBM 370 plus minis
- \* Full day to day responsibility
- \* Northampton based
- \* Salary to £7,000 p.a.

This is an excellent opportunity for an IBM operator to take the first step up the management ladder.

As Operations Controller you will supervise eight staff on our client's IBM 370/138 running under DOS/VS plus Varytek minis.

You should have in-depth operational experience on IBM hardware as you would be responsible for the efficient performance of all staff and equipment in the operations area. The ability to communicate effectively with user departments is also an important part of the job.

Full in-house training with the possibility of future advancement makes this a real career opportunity.

Our client is a wholly-owned subsidiary of an American company with a turnover of £40m per year. They have four UK sites with mini-computers, all controlled from their pleasant Northampton headquarters.

They offer an attractive package including five weeks holiday, subsidised restaurant and relocation assistance as appropriate.

For more details call Steve Baker or write to him at:



Castle House, Park View Road,  
Barnhampton, Dorset,  
Phone: (0427) 24841

**WORD PROCESSING**  
Excellent Remuneration plus Car.

We require specialists in the London and Manchester areas with a minimum of 18 months computer experience, who have had involvement in or exposure to one or more of the following:

- TELECOMMUNICATIONS
- REAL TIME PROGRAMMING
- TERMINAL EMULATION PROGRAMMING
- MESSAGE SWITCHING
- WORD PROCESSING
- ELECTRONIC MAIL
- TIME SHARING SUPPORT

The successful applicants will be required to work in a support role which will involve pre and post sales customer involvement, internal communications programme installation, evaluation and enhancement. AES word processors, from stand alone to shared logic, ideally all applicants should have experience in word processing, but full training will be given in all the relevant areas. Proven experience in a customer support role will be a distinct advantage.

Reporting directly to the Communications Manager you will become an integral part of the communications team which has been created specifically to promote and support AES WORD PROCESSING in the fully integrated office of tomorrow - today.

Other benefits include full working expenses, life insurance, four weeks annual holiday and associated public holidays.

Write or telephone for an application form to:  
Mark Robson, Communications Manager, AES DATA (UK), Ltd.  
27/29 Fitzroy Street, London W1P 5AF  
01-637 8086

**COMPUTER WEEKLY CLASSIFIED**  
DIRECT LINE 01-661 0121

the newspaper computer people rely on



## Analyst Programmer

### Process Control/ Data Acquisition

G. O. Searle is an international pharmaceutical company based in pleasant surroundings at High Wycombe in Buckinghamshire. A vacancy exists within our R & D Division Computing Department for an experienced analyst/programmer to join a newly formed small department which will be acquiring extensive new computing resources in 1981 to extend the existing PDP11/40 and Hewlett Packard systems. The initial application will be to develop software for controlling and monitoring the processes in our new Biological Development Pilot Plant. Future applications will include the design and development of systems for data collection and analysis in a number of departments within the Research & Development Division. An extension into microprocessor based systems is envisaged.

We are seeking a person with a degree in science (or equivalent) and experience with real-time systems who has worked on process control applications and is familiar with DEC minicomputers.

Candidates, male or female, are invited to obtain application forms from

Miss D. Wardman  
Assistant Personnel Officer  
Searle Research & Development  
Lane End Road  
High Wycombe, Bucks.  
(Tel: High Wycombe 21124,  
ext. 3374).  
Please quote  
reference CFB

**SEARLE**

## COBOL PROGRAMMERS

£6-7000/ depending on experience  
IN LINCOLNSHIRE

**The Company:**  
H. Leverton & Co. Ltd. holds the Caterpillar franchise for North East & South East England and covers from 8 locations. The Company sells and provides parts and service support to Caterpillar construction equipment, materials handling equipment, diesel engines and generator sets.

### Operates:

4 MEGABYTE IBM 4341  
Extensive AP Network  
On Line Real Time Systems  
On Line Program Development

Major and Plans Developments to introduce more on line real time systems using fully integrated data base techniques.

### The Position:

We are seeking to appoint commercial COBOL programmers to be based in Spalding, Lincolnshire, with 2-4 years' experience. Knowledge of CICS or IDMS would be an advantage. The company is a member of the Unilever Group which includes amongst other benefits 22 days' paid holiday and a contracted-out Pension Scheme.

If you are interested in being considered please apply in writing giving details of age, experience, qualifications and current salary to Mrs. D. M. Tutty, Personnel Department, H. Leverton & Co. Ltd., Westside Street, Spalding, Lincs.



© 1981 Leverton & Co. Ltd. Computer Caterpillar are trademarks of Caterpillar Inc. (110)

# Has the Milkman failed to deliver?

The milk rounds of Colleges and Universities can be quite a confusing affair. Carrots are dangled, promises made and images of bright futures projected onto unsuspecting minds. It's all too easy to make the wrong choice isn't it?

Do you feel that your career as a Programmer is moving in the wrong direction? Or is it not moving at all? Then consider the growth path we offer in R & D programming.

We are a thriving computer manufacturer with a modern, well equipped research and development centre located in the Northern Home Counties.

Our Company is all about success — and success breeds success.

Our hardware and software products are the most versatile and powerful of their type currently available. Our staff are young, and we actively encourage them to develop their own ideas by providing an ideal environment which fosters creativity.

Our Systems Programmers work in small teams, each member having access to a worldwide network of 66 computers through their own personal interactive terminals.

If you were allowed to develop your own concepts, would that give you the job satisfaction you are seeking? If so, we have a number of opportunities for bright young people with a desire to contribute to the further evolution of data processing techniques.

A degree is not absolutely essential, but you should have some practical experience of a structured language. Most of our work is carried out in PL/I, although if you have a knowledge of other high level languages such as PASCAL, ALGOL or CORAL, we will offer you the opportunity to exploit your interest in systems software.

There are a number of advanced areas in which you could find your initial involvement. These include:

- \*Communications
- \*Transaction Processing
- \*Data Dictionary
- \*Language Processors
- \*Network Management Systems

Promotion can be attained quickly, based on above average performance. Conditions of employment are excellent with starting salaries ranging up to £7,500 per annum, together with free BUPA membership, a contributory pension scheme, a staff share purchase plan and a full relocation package.

Interested? Then call our Advising Consultant, Ian Payne on 021 236 3781 (24 hour answering service) or 0927 282430 (evenings and weekends). We look forward to meeting you.

## Specialist Computer Recruitment Ltd

London 01 435 8871 3 Mandeville Place, Wimpole Street, London W1M 5LB  
Birmingham 021 239 3781 36-37 Great Charles Street, Curzonway, Birmingham B3 3JL  
Manchester 061 833 6427 Blackfriars House, The Parade, Manchester M3 2JA  
Bristol 010 322 940 71-73/71 Avenue House 327, Bath Road, Bristol

## Systems Programmers

### Grow with Mobil in the Garden of England

At Sevenoaks in Kent, Mobil Data Services have an International CP Centre providing a variety of computing services to some 22 Mobil Oil Corporation companies in the UK, Finland, Scandinavia and Benelux countries. Our current hardware consists of an IBM 3031 running under MVS/SE with communication links to Mobil refineries, blending plants, Marketing and North Sea operations. A network of IBM 8100 DDP Systems is currently being installed and a requirement for up to 8 such installations has been identified. To complement this network the central site machine capacity will be augmented by the installation of an 8 megabyte 4341-2 in October 1981.

If you're interested in getting to grips with the MVS and DDP this could be your chance. Company expansion has created several excellent opportunities for system programmers, men or women, seeking to broaden their skills and to grow with a major international organisation. The basic entry requirement is at least one year's system programming experience. At Sevenoaks you will be involved with MVS, Cullinane's IDMS Database, ALTERCO's SHADOW TP Monitor, TSO/SPR, NCP/TAM and a host of the latest software.

**SALARIES FOR THESE POSITIONS WILL BE NEGOTIABLE AROUND £10,000**, depending on ability and experience, and will be supplemented by an exceptional benefits package. This includes sickness and pension schemes, free life assurance, flexible working hours, relocation packages very hard to beat — we'll pay full Estate Agent's fees, removal costs, legal costs, survey fees, ex-greffe refurbishing allowance, telephone installation charges, hotel bills for one month, plus costs for two month's additional accommodation, house finding expenses and if you're temporarily away from your family fares paid home at weekends.

**Mobil**

## ANALYST/PROGRAMMERS

### Examine the career opportunities at Oxford Regional Health Authority

Several vacancies have arisen for Analyst/Programmers with at least two years' computing experience to come and join a friendly team of Professionals working of a wide range of hardware which includes PDP 11/70s, ICL 2900 and 2944, and languages including PL/I, COBOL and FORTRAN.

The work is exceptionally interesting, offering a great deal of variety and challenge. Applications should be sent to the Director of Health Services, Oxford Regional Health Authority, 100, High Street, Oxford OX1 2JL.

We offer a salary on a scale ranging from £7,500 per annum for a newly qualified Analyst/Programmer to £12,000 per annum for a Senior Analyst/Programmer.

For a worthwhile career with healthy prospects, apply to the Director of Health Services, Oxford Regional Health Authority, 100, High Street, Oxford OX1 2JL.

The Recruitment Officer, Oxford Regional Health Authority, 100, High Street, Oxford OX1 2JL.

Tel: Oxford 64891, ext. 367/368.

Closing Date: 31/3/81

## Cuts corners

Even today, outstanding career openings exist in Computers & Telecommunications at all levels and throughout the UK. Here's the key.

## The Lansdowne

Appointments Director

100, High Street, Oxford OX1 2JL

Name \_\_\_\_\_

Address \_\_\_\_\_

Occupation \_\_\_\_\_

## NEW ZEALAND GOVERNMENT Computer Services Division STATE SERVICES COMMISSION

The Computer Services Division of the New Zealand State Services Commission provides computer services and advice for the majority of New Zealand Government Departments. The Division is organised into a Head Office, four computer centres and a number of input centres.

**Head Office** — responsible for investigating departmental requirements, undertaking hardware and software evaluation, providing overall plans to co-ordinate and control future EDP requirements and advising Government.

**Cumberland Computer Centre, Wellington** — provides design programming and processing facilities relating to large financial insurance and statistical applications. The Centre operates twin IBM 370/168s in multi-processor mode running under MVS/JES2.

**Pipitea Computer Centre, Wellington** — provides services relating to tax collection, welfare payments and land valuation. The Centre is equipped with two Burroughs 84700, 500K Bytes and 39 H.P. 21Mx acting as concentrators.

Computer Services Division has a limited number of career positions available now at:

### Head Office 1. SENIOR EDP CONSULTANTS/ EDP CONSULTANTS (Audit)

\$NZ14,314 to \$NZ25,186. Lengthy and varied EDP experience required, preferably in consulting or EDP Audit.

### 2. SENIOR EDP CONSULTANTS/EDP CONSULTANTS (Technical Services)

\$NZ14,314 to \$NZ25,186. Lengthy and varied EDP experience required, preferably in consulting.

### 3. EDP CONSULTANT (Hardware) (Technical Services)

\$NZ14,314 to \$NZ25,186. At least five years' experience in computer maintenance engineering with proven leadership/supervisory ability to lead a team of technicians on network maintenance and installation.

### Cumberland Computer Centre 4. SYSTEMS PROGRAMMERS

\$NZ12,549 to \$NZ17,731. At least two years' proven general systems programming experience in large IBM environment required.

### 5. SYSTEMS ANALYST (Project Leader)

\$NZ13,443 to \$NZ19,950. Good all round EDP experience required with proven record in system design.

### 6. SYSTEMS ANALYSTS/SENIOR PROGRAMMERS/PROGRAMMERS

\$NZ11,429 to \$NZ19,950. Previous data processing experience required, preferably in a large system with database and telecommunications.

### 7. SENIOR COMPUTER OPERATORS

\$NZ18,914 to \$NZ18,923. At least five years' experience, specifically MVS/JES2, TSO, IMS/DC, network control, IBM job control language.

**Trentham Computer Centre** — Located 20 miles north of Wollington in the City of Upper Hutt. Provides service relating to scientific and statistical work through a series of RJE terminals. The Centre is equipped with dual ICL 2980, 8 M Bytes and supports a large interactive and transactive processing network using IDMS X as a database.

**Wanganui Computer Centre** — Wanganui is a pleasantly situated provincial city on the West Coast of the North Island. The Centre is equipped with a UNIVAC 1110 3 x 2, 3.3 M Bytes equivalent computer which provides services for the law enforcement functions of the Department of Police, Justice and Transport.

### Pipitea Computer Centre 8. ASSISTANT DATA BASE ADMINISTRATOR

\$NZ18,839 to \$NZ21,520. Sound programming background, some experience with Burroughs DMS II (applicant with Forte II or other database management system experience considered).

### 9. SYSTEMS ANALYST

\$NZ13,443 to \$NZ19,950. Five years' analyst experience required.

### 10. SENIOR OPERATORS

\$NZ18,914 to \$NZ18,923. At least four years' operating experience, on a Burroughs 84700 or relevant machine essential.

Trentham Computer Centre

### 11. SYSTEM CONSULTANTS

\$NZ22,477 to \$NZ25,186. Extensive knowledge in the investigation and development of VME/8 operating system.

### 12. SENIOR SYSTEMS PROGRAMMERS

\$NZ18,839 to \$NZ21,520. At least two years' proven general systems programming experience in large ICL environment required.

Wanganui Computer Centre

### 13. SENIOR SYSTEMS PROGRAMMERS/ SYSTEMS PROGRAMMERS

\$NZ18,839 to \$NZ21,520. Minimum two years' experience on UNIVAC 1100 systems, assembler experience mandatory preferably in Exec 8 DMS 1100 or CMS.

### 14. SENIOR PROGRAMMER/ SENIOR PROGRAMMER (Training)

\$NZ17,731 to \$NZ19,950. Five years' experience required. UNIVAC systems with database preferred.

Assistance will be provided to staff recruited in the United Kingdom to move their family and effects to New Zealand.

The General Manager, Computer Services Division, Mr. R. Wheeler, will travel to London to conduct interviews.

For further information and application forms, please contact:

EDP Recruitment (2/33/10 CW), C/- Chief Migration Officer, New Zealand High Commission, New Zealand House, Haymarket, London SW1Y 4TQ (Telephone 01-930 8422 Ext. 384 or 432)

Closing Date: 20 February 1981

Job no 1170







## DHSS HYPERTENSION CARE COMPUTING PROJECT

This project, which is based at Northwick Park Hospital, processes clinical data about patients being treated for raised blood pressure in a number of hospital clinics and general practices around the country. The processing is at present in batch on an ICL 1900 but a new 5-year grant has been obtained from the DHSS to extend the system and move it to the new local DEC 2080, and to acquire remote intelligent RJE terminals.

The project grant supports four posts for computing professionals and three of these are at present vacant. Applicants should have a formal training in computing up to graduate level (or the equivalent length and breadth of experience). The length and type of post-graduate experience required varies with the different posts.

### Principal Analyst/Programmer

**£8,544 to £10,275 (NHS Scale 14)**

This post is for someone with considerable technical knowledge and experience and the ability to lead the small team. The appointee will help to choose the new equipment and to design and implement the new system. At least five years' post-graduate experience including the handling systems, programming in more than one language and supervising staff, is required. This appointment terminates with the current grant on May 31, 1985.

### Senior Analyst/Programmer

**£7,681 to £9,265 (NHS Scale 9)**

This post is for someone to retrieve and analyse data from the file and help with the new system. At least two years' post-graduate experience of systems analysis and programming, preferably within a team, is required. This appointment is for two years.

### Analyst/Programmer

**£6,839 to £8,221 (NHS Scale 4)**

This post is for someone to design and implement progress and will afford the opportunity for some experience of systems analysis and design. It is suitable for someone who has received appropriate training and wishes to develop their career by obtaining practical experience. This appointment is for two years.

Further particulars and application forms may be obtained from the District Personnel Department, Hammersmith Hospital, Du Cane Road, London, W.12. Telephone: 01-743 2030, extension 40. The closing date is February 9th, 1981.

## DEPUTY SHIFT LEADER

**£8,983 - £9,542 INCL**

This is what we expect to pay for a Deputy Shift Leader with the drive, enthusiasm and proven managerial experience to assist in the control of a shift of highly efficient operating staff. In addition a high degree of IBM technical knowledge of operating is required.

Our operating team work to very high standards and you will be required to assist in the maintenance and enhancement of these in a dynamic environment.

Currently LOLA has a 6-megabyte IBM 370/156AP and a 4-megabyte Magnuson M60 (shortly to be upgraded), running under MVS JES2 supporting large IMS TP, TSO and APL networks.

Our requirements for this post are a minimum of 4 years' appropriate experience with at least 2 years in a senior supervisory capacity. Proven experience of controlling a TP network is essential.

Further details from Peter Anthony on Ext. 266.

Application forms can be obtained from:-

Mrs. Beryl Dorrington  
LOLA (London On-Line Local Authorities)  
FREEPOST, Tower Point North  
Sydney Road  
Enfield, Middx. EN2 8UE  
Tel: 01-366 6611 (Ext. 276)

**LOLA**

(4100)

# OVERSEAS VIA I.A.

**SYSTEMS PROGRAMMER** required to work on an IBM 4341 running under OS/VS1 using CICS, VST, VTAM etc. The work will involve general maintenance of the systems, housekeeping and file maintenance. Knowledge of the Dutch language advantageous. Location: The Netherlands

**ANALYST/PROGRAMMER** required to program in ASSEMBLER on MINI hardware. Work involves the development of scientific X-ray application systems. Location: The Netherlands

**SENIOR SYSTEMS ANALYST/PROGRAMMER** required with a good knowledge of DLI and COBOL. Hardware in use IBM 4341 running under DOS/VSE and CICS. Knowledge of the IBM package COPIES advantageous, not essential. Applications to be sent on include on-line production/inventory control system and other materials management modules. Location: The Netherlands

**MINI/MICRO specialist** required to write USER REFERENCE MANUALS for a new range of MICRO's being developed. Location: Vienna

**SYSTEMS SOFTWARE ENGINEER** required with an in-depth IBM UTILITIES knowledge to work on an IBM 4341 running under DOS/VSE using CICS, MVS, TSO, VTAM, MCP etc. Location: France, good knowledge of the French language essential

**SENIOR COBOL PROGRAMMER** with program design experience in business computer experience essential. Location: The Netherlands

**ANALYST PROGRAMMERS and TEAM LEADERS** with excellent COBOL, are required to work on the conversion of a number of systems to IBM hardware. Other D.P. languages required are RPG II, FORTRAN and ASSEMBLER. Applications range over scientific, engineering and petrochemical subjects. An in-depth knowledge of any of the following IBM UTILITIES will be advantageous: CMS, TSO, VSAM, VTAM and FOURMIST. Location: The Netherlands

**ANALYST PROGRAMMERS** with experience of REAL-TIME TELEPHONE SWITCHING software. Location: Paris

**TECHNICAL AUTHORS/TRANSLATORS** with a basic electronics knowledge and/or digital M.O.D. systems experience to write and translate documentation from French to English or German to English. Some wire-guided missile or optica experience preferable. Location: Paris

Outlined above is a selection of current requirements. Space and time make it impossible to list all the opportunities available. Therefore, if you would like to work overseas and for a highly-respected service company, please telephone or send your career resume to me because I may well already have an excellent opportunity to offer you.

**PLEASE WRITE OR TELEPHONE NOW**  
Ann Arledge, Marketing and Recruitment Director  
Industrial Artists Limited, Benoroff, Hitchin, Herts.  
Tel: (0462) 57141 (Day) or (0462) 70701 (Even/Weekends)  
IA is a registered Employment Business licensed by H of C.



# Chief Programmer

**circa £10,000**

**N. Middlesex**

**IBM COBOL & Minicomputers**

We are the British subsidiary of a major American manufacturing company associated with the electronics industry. We operate an IBM 370/135 (DOS) and five mini-computers which are linked to provide on line and batch systems.

Due to internal promotion we are seeking a Chief Programmer to supervise a small team and to be responsible for all application programming on both the mainframe and minicomputers. Candidates should possess considerable IBM COBOL experience, preferably coupled with a working knowledge of mini-computers. Reporting to the Systems Manager, the position requires an enthusiastic supervisor who is also an effective working programmer able to assume a key role in a company which is heavily committed to D.P.

The successful candidate will be offered a salary, depending on relevant experience, of around £10,000 p.a. The Company also provides excellent working conditions, generous fringe benefits, and ample opportunities for career progression in a dynamic situation and congenial environment.

Please write or telephone with comprehensive details of experience and qualifications naming concerns to whom your application should not be forwarded to:  
Gordon F. Vivian,  
Managing Director  
(Ref: 541/CW)  
Hemmings Recruitment Associates Limited,  
148 Fleet Street,  
London EC4A 3JP.  
Tel: 01-353 7661.

**HRA**

**Hemmings Recruitment Associates Limited**  
London · Midlands · North

**NEW ZEALAND UNIVERSITY OF CANTEBURY CHRISTCHURCH**

## PROGRAMMER/ANALYST

Applications are invited for the above position in the Computer Centre.

Applicants should possess a suitable degree, preferably with Honours and practical experience in applied electronics would be an advantage. A high aptitude for, or proven ability in, computer programming is required.

The salary range for this appointment is NZ\$18,225 to NZ\$22,400 per annum.

Applications should be submitted, addressed to the undersigned, and arrive by 18 February 1981.

**UNIVERSITY OF CANTERBURY PRIVATE BAG CHRISTCHURCH NEW ZEALAND**

(4117)

**QUEEN MARY COLLEGE University of London Faculty of Engineering COMPUTER ASSISTANT TEACHING UNIT**

## GRADUATE RESEARCH ASSISTANT

required to develop and implement computer based teaching materials. A degree in engineering science or mathematics essential, with experience in computer programming, preferably in FORTRAN, and an interest in educational innovation.

The appointment, which may be suitable for a new/recent graduate, will be for two years' initially. Salary scale (under review) £4765-£6888 p.a. plus 1981 London Allowance. Further details and application forms available from The Secretary, QCU, Queen Mary College, Mile End Road, London E1 4NS, to be returned by 10 February.

(4100)

**St. Mary's Hospital Medical School (University of London) Norfolk Place London W2 1PG**

## PROGRAMMER

required as soon as possible for BACTERIOLOGY DEPARTMENT. One year project to process analytical data for automated identification of bacteria. Degree in Statistics or Computing advantageous but not essential. Experience of statistical programming, use of Commodore PET and of statistical packages required. Salary within range £5,806-£8,245 + £367 p.a. London Allowance.

Further details from Dr. S. Seabomb or Mr. J. Thirwell.

Apply: The Secretary at above address with full curriculum vitae and names and addresses of two referees not later than 8 February. Please quote Ref. 555P.

(4100)

**Robert Gordon's Institute of Technology Aberdeen Computer Services Unit**

## SYSTEMS PROGRAMMER

Required to maintain/develop systems software on DEC system - 20 multiprocessor computer. Applicants should have experience in systems programming on DEC 10/20 systems. Consideration may also be given to candidates with experience on other systems.

Salary £11,000 to £13,000 per annum plus £1,000 p.a. superannuation and £1,000 p.a. gratuity on leave to £25,000.

**ASSISTANT PROGRAMMER** Applicants must have formal academic qualifications and preferably a minimum of 6 months' practical programming experience. Salary £5,472-£8,000 and from £1,471 to £1,800 p.a. superannuation. Local Government Superannuation Scheme. Application forms from: Secretary, Robert Gordon's Institute of Technology, Aberdeen AB9 1PR.

# Computer Professional Recruitment Consultancy

## R29 TELECOMMUNICATIONS?

**TWO MARKET LEADERS NEEDED:**

### SENIOR SYSTEMS SUPPORT - COMMUNICATIONS

**HEREFORDS HIRE c. £16k plus bonus**

Engineering service background. Experience in installation of modern/line terminals, telecomm in computer environment, perhaps network control.

## R30 SENIOR/JUNIOR SALES EXECUTIVES

**2 BIRMINGHAM, 4 SOUTH-EAST, 4 MANCHESTER**

From £8.5k to £9k basic, £15k to £18k on quota plus car

Must be experienced salesman with data comm knowledge. Engineering background useful.

## R31 INTERNAL SALES (TRAINEE)

**BIRMINGHAM circa £5k**

Trainee, could be direct from college with technical background. Good appearance, able to communicate and to progress to full sales role.

## R32 AREA SALES ENGINEERS (TWO)

**HERTFORDSHIRE/ESSEX/CHESHIRE**

£7k to £7.5k - £14k on quota plus car

Experienced, successful salesman only. Communications experience on advantage. Reliable quotes, commission accelerator thereafter. Also sales engineer selling to OEMs and System Houses working from Hampshire.

## R33 SALES ENGINEERS

**EAST MIDLANDS/LEICESTERSHIRE/BIRMINGHAM**

**SOUTH-WEST/BERKSHIRE/DOVER/MANCHESTER**

£10k package plus car

22-23 years of age, computer science, O.N.C. graduates, with subsequent 1-2 years' industry experience, not necessarily communications. Smart appearance, good communicators wanting well-paid sales career.

### STOP PRESS

MVS experts, big package, contact LONDON office immediately.

(4121)

## ASSISTANT TO DP/WP CO-ORDINATOR

An expanding Lloyd's Insurance Broker is seeking a person of 24/25 years of age to act as an assistant to their DP/WP Co-ordinator.

The applicant must have some IBM system 3/34 operational and programming experience. Also preferably some insurance knowledge.

Salary negotiable circa £7,000.  
Suitable applicant please contact:  
Mrs. S. Palmer on 01-481 3904

(4100)



**SOUTH WALES CONSTABULARY**

## FORCE TECHNICAL COMPUTER OFFICER

**Second Advertisement**

**£9,411 to £10,542**

(1st April 81, £9,878-£10,731)

The South Wales Constabulary are seeking an experienced computer professional to fill the new post of Force Technical Computer Officer of Police Headquarters, Bridgend.

The Force Technical Computer Officer will assume control of hardware and software of a Honeywell Level 6 computer based Command and Control system utilising a dual processor system supporting disk, Visual Display Units and forty printers, for which a contract has been awarded. He/she will be expected to liaise with police officers at all levels and give technical advice on problems arising with the operation of all the computer equipment associated with the South Wales Constabulary.

Applicants should have a relevant degree or professional qualification and considerable experience of the design and programming of dedicated real time systems using mini computer hardware. The position is suitable for a person currently in a senior technical support position seeking wider managerial and technical responsibility.

Write or telephone for an application form, returnable by the 8th February, 1981, to The Chief Constable, South Wales Constabulary (Computer Project), Police Headquarters, Bridgend CF33 3SR. Telephone 0866 55518 (extension 381/382). Candidates who have already applied need not re-apply as their application will be considered after the revised closing date. Applicants with housing and relocation expenses will be available where appropriate.

(4100)



**Colinvaughan College of Computing University College Cork**

## STATUTORY LECTURESHIP IN COMPUTER SCIENCE

Applicants should have a relevant degree or professional qualification and considerable experience of the design and programming of dedicated real time systems using mini computer hardware. The position is suitable for a person currently in a senior technical support position seeking wider managerial and technical responsibility.

Write or telephone for an application form, returnable by the 8th February, 1981, to The Chief Constable, South Wales Constabulary (Computer Project), Police Headquarters, Bridgend CF33 3SR. Telephone 0866 55518 (extension 381/382). Candidates who have already applied need not re-apply as their application will be considered after the revised closing date. Applicants with housing and relocation expenses will be available where appropriate.

# Contract Assignments Banking

Link Associates is a Software House seeking 3 Analysts and 5 Programmers to join Development Teams working for a major American Bank in London.

We can offer long, secure contracts in an interesting and well-disciplined technical environment. The installation is IBM 4341 under DOS/VSE using PL/1, CICS and LIBRARIAN and the skills required are:

- |                                |                            |
|--------------------------------|----------------------------|
| <b>ANALYSTS</b>                | <b>PROGRAMMERS</b>         |
| ★ On-line Design               | ★ Minimum 2 years PL/1     |
| ★ Technical Bias               | ★ On-line Programming Aids |
| ★ Commercial Banking preferred | ★ Structured Techniques    |

DO NOT DELAY! Contact us now to arrange early interviews for contracts starting in February, March, April and May.

Please phone: Sheila Fox  
**LINK ASSOCIATED LIMITED**  
24a High Street, Chesham, Bucks. (02405) 4922



## BOX Nos.

Box number should be indicated by applicant.

## DO YOU UNDERSTAND COMPUTERS? CAN YOU SELL?

Do you understand computers? Can you sell? If yes, then you are the person we are looking for. We are a leading computer software house and we need salesmen who can sell our products. If you are interested, please contact us at the following address: **LINK ASSOCIATED LIMITED, 24a High Street, Chesham, Bucks. (02405) 4922**

# SYSTEMS ANALYST

**FINE ART AUCTIONEERS LONDON W.1. c.£9,500**

Our Client is the foremost firm of International Fine Art Auctioneers in the world with sales of £235 million. The continued growth and increasing sophistication of the business has created the need for further systems development and therefore the appointment of an additional Systems Analyst.

You will join a small but busy team developing integrated databases in a real-time environment on a Burrough's mainframe where you can expect to achieve a high level of job satisfaction and career advancement.

We expect you to have a COBOL programming background and at least two years' systems analysis experience which should include seeing a system through from start to implementation. Experience on Burrough's equipment would be an advantage but is by no means essential.

For further information on this exceptionally interesting position, please contact MARK IRENS quoting reference CW2201.

**HUTTON EXECUTIVE SELECTION LTD. HUTTON HOUSE, HUTTON STREET, LONDON EC4A 3HP**

TELEPHONE: 01-353 7141 (24 HOURS)

**Hutton**  
SPECIALIST RECRUITMENT CONSULTANTS

# Targa

**CITY ANALYST (BANKING) c.£11,000**  
The London Branch of a major European bank is about to commence development of its banking systems and requires a SYSTEMS ANALYST to complement the existing team. The ideal applicant will have at least one year's experience as an Analyst and should have been involved in a project from feasibility to implementation. It is also essential that experience of FOREIGN EXCHANGE and REAL TIME systems forms part of the background. Excellent banking fringe benefits apply. Ref: R.3177.

**CITY RECRUITMENT CONSULTANT c.£10,000**  
Targa Computer Services which was established in 1978 is part of a group of companies serving the computer industry. We seek a CONSULTANT to expand activities within the more SENIOR range of applicants. Ideal candidates will be over 25 with experience of SYSTEMS ANALYSIS or PROGRAMMING and have the ability to assess people and communicate effectively at all levels, advising clients of salary levels, advertising and job specification. Generous basic salary, incentive and benefits are offered. Ref: R.3187.

**ESSEX (S.E.) CHIEF PROGRAMMER c.£11,000**  
A leading company in the leisure industry seeks a Chief Programmer to lead an existing team. Ideal candidates will be familiar with structured programming techniques and have the management skills to recruit, train and develop staff together with the ability to assist at the systems design stage. A COBOL background is essential and exposure to recent IBM hardware together with CICS a definite advantage. Benefits include relocation, bonus and flexitime. Ref: R.3184.

**CITY COBOL PROGRAMMERS c.£7,000**  
A leading City-based international company seeks COBOL programmers with upwards of two years' experience. Very bright young people with UNIVAC or IBM experience together with an exposure to on-line programme development, DATABASE and sales order processing would be particularly welcome to apply. This is a development opportunity in an expanding company offering excellent fringe benefits. Ref: R.3182.

**CITY PROGRAMMERS (BANKING) £7-10,000**  
We require programmers and SENIOR programmers for leading city-based European banks. AIMS experience is essential and demonstrable supervisory or management abilities will be required by the senior people. The usual fringe benefits will apply. Ref: R.3176/8.

**ESSEX ANALYST/PROGRAMMERS £7-10,000**  
Several Analyst/programmers are required to work in a recently installed UNIVAC 1100/61 installation. A COBOL background together with expertise in FILE-MAINT, UNITEO and applications work on FINANCIAL or MANUFACTURING systems is required. There is also a requirement for an ANALYST with considerable DATABASE experience. Ref: R.3174/5.

**TARGA COMPUTER SERVICES**  
46/47 LONDON WALL  
LONDON EC2M 5TE 01-638 6381

10 LINES 24-HOUR ANSWER



# MYRIAD

Outstanding opportunities exist for experienced Data Processing staff to play a significant part in the development of major international systems based on large IBM equipment. The company's European network links OSLO, STOCKHOLM, COPENHAGEN, VIENNA, MILAN, BRUSSELS, AMSTERDAM, PARIS, LONDON and currently vacancies exist in:

## ZURICH & DUSSELDORF

Joining specialist project teams, the successful candidates will be involved in the system design, specification and programming of several financial and marketing based applications making use of the European network.

### ANALYST/PROGRAMMERS... TO £16,000

- \* 3 YEARS' D.P.
- \* SOUND COBOL KNOWLEDGE
- \* PREFERABLY IBM OS
- \* USER LIAISON EXPERIENCE

- \* RELOCATION ASSISTANCE
- \* MODERN OFFICES
- \* INTERNATIONAL SYSTEMS DEVELOPMENTS

The company is one of the world's most successful international organisations and offers a secure and progressive future to people appointed. The vacancies offer the opportunity to enjoy a high standard of living and considerable potential for personal career development.

Ref. N1/2201

MYRIAD APPOINTMENTS LIMITED

30 Fleet Street London EC4Y 1AA Telephone 01-353 0981 24 hours



### (SENIOR) SYSTEMS PROGRAMMER £7000 - £10,500

Opportunities exist to join our newly formed team responsible for the installation, tuning and monitoring of system software. Scope is also likely to occur for a growing involvement in the field of capacity planning related to hardware, software, and user systems.

Applicants should have been engaged in DP for at least 2 years. Status and rewards will reflect the level of experience in systems programming and in particular with MVS, TSO and SMP. Knowledge of ACF/VTAM, IMS, VSPC and RACF would be an advantage although full training will be available.

COVENTRY CITY COUNCIL recently created the Computing Services Unit with over 150 posts in its 6 Divisions to manage the newly installed IBM 3031 and the existing ICL system 4/72, along with a Minis and Micris. The 3031 (4mb, 3810mb of 3350 discs) supports MVS and TSO with plans for VSPC and IMS. DC and ADF. It will be enhanced substantially over the next 4 years to meet considerable computing demands.

**SALARY AND CONDITIONS:** These posts are open to male and female applicants. We offer a salary negotiable within the range quoted, career development largely dependent on ability, job security, excellent holiday entitlements and a relocation expenses scheme.

**WRITING TO:** Head of Computing Services, Coventry City Council, Council House, Coventry CV1 5HQ.  
**OR RING:** Stan Heywood on Coventry (0203) 2555. Extension 2227 for further details, an informal discussion, and an application form. Closing Date for Applications: 3rd February 1981.

### IBM OPERATORS £5200 - £6700 (including shift allowance)

These posts offer the chance to operate the new IBM 3031 and the established ICL system 4/72. They also provide opportunities for involvement in all aspects of the Operations function including networking, JCL preparation and problem determination. Training will be provided wherever appropriate.

Current shift arrangements comprise 1 (IBM) and 3 (ICL), with plans for work transfer to enable these to be replaced by 2 (IBM) and 2 (ICL) by the end of 1981.

Applicants should have a minimum of 12 months experience, preferably on IBM equipment using MVS.

UNIVERSITY OF  
BRISTOL

Applications are invited for the post of

### COMPUTER PROGRAMMER

in the MANAGEMENT SYSTEMS  
DIVISION of the UNIVERSITY OF  
BRISTOL. The post will involve  
programming in COBOL for  
both main systems and the maintenance  
of existing systems. The University  
Administration operates a  
Monday-Friday 9.00-5.00 rapid  
response system which provides both  
and interactive processing services  
throughout the university. The  
appointment will be particularly suited  
to candidates with 2-3 years' programming  
experience and preferably with graduate or other  
qualifications in Computer Science.

The appointment will be made on  
the Senior Administrative Staff  
Scale Grade 1A (£4795-£5955 per  
annum) under review with placing  
according to qualifications and  
experience. USS benefits.

Application forms and further  
particulars (quoting 5781) and enclosing  
a self-addressed envelope 10" x 4" may  
be obtained from the Academic  
Appointments Officer, University of  
Bristol, Royal College Building,  
204 College Street, Bristol G1 1LW,  
to whom applications should be  
sent by 30 January 1981.

(4139)

QUEEN MARY COLLEGE  
University of London  
Faculty of Engineering  
COMPUTER ASSISTANT  
TEACHING UNIT

### GRADUATE RESEARCH ASSISTANT

required to develop and implement  
computer based teaching  
materials. A degree in engineering  
science or mathematics essential,  
with experience in computer  
programming, preferably in FORTRAN,  
and an interest in educational  
innovation.

The appointment, which may be  
suitable for a new recruit graduate,  
will be for two years initially. Salary  
scale (under review) £4795-£5955 p.a.  
plus £887 London Allowance. Further details  
and application forms available from  
The Secretary, (CW), Queen Mary College, Mile End Road,  
London E1 4NS, to be returned by 18 February.

(4100)

ESSEX COUNTY COUNCIL  
SOUTHEND COLLEGE OF  
TECHNOLOGY  
Carnarvon Road  
Southend-on-Sea  
Essex SS2 6LB  
Telephone: 0702 355531

### LECTURER 1 - IN COMPUTING

This post is vacant from 1st May 1981 but applications from those  
unable to give up duty until a later  
date will be considered.

Candidates should have a degree or  
equivalent qualification in a  
relevant area. Ability to teach to  
G.C.E. 'A' level Computing essential.

Salary Scale: £4,885-£6,088  
per annum (under review).

Further particulars and application  
forms from the Principal.

(4106)

## NEWBURY DISTRICT COUNCIL

### COMPUTER SECTION

We are installing one of the new range high performance  
multi-purpose I.C.L. ME29/35 computers which will  
involve the transfer of systems from our existing 2803/35  
R.J.E. devices linked to Berkshire County Council. To ensure  
maximum gain from our computer resources we have planned an interesting and varied  
development programme.

We are looking for:

### PROGRAMMERS

£6,057 - £7,338

The postholders will be required to have a detailed  
knowledge of COBOL programming and will join a small  
team involved initially in the transfer of systems to the  
ME29, and play an important part in the overall  
development of the computer service.

WE OFFER:

- A generous relocation scheme, including legal/estate  
agent fees to a maximum of £1,150, 100% removal  
expenses, disturbance allowance of £200, temporary/per-  
manent housing accommodation, temporary subsistence  
allowance, bridging loan facilities, cinema and recreation  
facilities, superannuation scheme and excellent working  
conditions.

For further information and application forms contact:  
Personnel and Management Services Unit,  
Council Offices, Chesel Street,  
Newbury, Berkshire  
Tel: Newbury (0345) 42400, Ext. 385

**CLOSING DATE FOR RECEIPT OF APPLICATION FORMS:**  
First Post Monday, 3rd February 1981

## SMR

Sales & Marketing Recruiters Ltd

Victory House, 99 Regent Street, London W1R 7HB

A Sales and Marketing Services Company  
London & Midlands

## Sales Executives

—with a talent for management  
Advance your career into large-scale mainframes

Our client is one of the world's foremost suppliers of mainframe computers; one of those names that gives real credibility to your curriculum vitae. This company has the qualities that well-informed, ambitious sales executives instinctively look for when seeking a career opportunity. Unquestionable market status and product credibility, substantial and continuing investment in research and development, ongoing sales and product training (in the USA as well as the UK), positive opportunities for personal advancement and above all real commitment to the well-being of its employees and its clients.

We are seeking top-flight, proven senior sales executives, with at least three years experience of selling hardware based computer systems to major companies and institutions, for account management and high level sales negotiations, related to large-scale mainframe computer users. Job responsibilities will initially involve the protection, expansion and overall development of substantial existing installations, but new account selling will play an increasingly important role. These activities will demand the talent to develop and implement complex sales strategies at all levels of business operation.

The jobs are based in

London

and on-target income is likely to be in excess of

£18,000 + company car

A minimum income guarantee will be negotiable for the first 12 months of employment.  
Please provide complete career details to Alan Williams or Alasdair Scott quoting reference RBC/101.

Tel: 01-734 9776

Midlands and North - Leicestershire (0532) 55617  
Answering Service after 6 pm and weekends  
SALES TRAINING, MARKET RESEARCH, RECRUITMENT

Ferranti Computer Systems Ltd.

## Field Sales

PT7 Programmable Terminals are Advanced Alternatives to ICL 7502 and IBM 3270.

PT7 Programmable Terminals offer valuable additional facilities for the data processing manager, and the terminal user alike.

PT7 Programmable Terminals offer the financial controller better price/performance ratios.

PT7 Programmable Terminals are already well established and, with several new product releases recently announced, are set to penetrate still further the terminal systems market.

PT7 Programmable Terminals selling at customer level is backed by a major advertising and exhibition campaign.

Ferranti Computer Systems is recruiting experienced Sales Personnel to cover the South of England, and persons with relevant experience in selling interactive terminals for connection to ICL and IBM computers are invited to apply for these rewarding positions.

Successful applicants will be paid an attractive salary, a company car is provided, there is a bonus scheme and the usual fringe benefits of a progressive company.

Apply in writing to Mark Freeman, Ferranti Computer Systems Ltd.,

Simonsway, Wythenshawe, Manchester M22 5LA, quoting reference 80/W/15/CV or telephone 061-499 3357 Extension 223 or after working hours 061-488 2540.

**FERRANTI**  
Selling technology

## THE SALES BIT

### Common causes of failure in sales recruitment

LAST week I wrote about the common occurrence of sales recruitment failure, due primarily to a lack of urgency at branch sales management level. Of course, there are many other reasons why good candidates are lost; also a number of ways to raise the level of success.

While indecent haste is clearly to be avoided, there is no doubt that beyond an arbitrary point of two to three weeks' duration, the chances of recruiting a good candidate decline at an exponential rate. In most cases the problem is a matter of priorities. Sales managers can easily delude themselves into believing that recruitment must have a lesser priority than sales activity and a reactive process. This may be true for a while, but the price of delaying recruitment soon becomes very high; particularly in the form of new business sales.

Unrealistic requirements and procrastination are also significant causes of delay in the recruitment process. Peter Jones, of Tymshare, sometimes refers to a recruitment situation he calls the George Best syndrome. This is where a sales manager, rather than observing the realities of what is available, the price he can afford and the attractions of his company relative to those of other competing employers, looks for a "star" who is prepared to transfer for average rewards and solve all the selling problems.

#### Preparation

Another reason for the failure of sales recruitment is the nature of the interview. Candidates often complain of unsatisfactory meetings, lacking in preparation and devoid of job specification or territory definition. This kind of situation can only serve to degrade both the manager and the job.

It is essential that all interviews are prepared and have a planned structure to cover all aspects of the job situation. They should also be backed by promotional literature. After all, the job interview is just another sales situation, but one where both are selling and both are buying. Trial closes and final closes are very much part of the action. If the deal feels right, ask for the order!

#### Indecision

When he eventually realises how unrealistic his stance is, that such people are at a premium and typically cannot afford to leave their present source of high reward, and have better options if they did, he begins to modify his position. This often develops into a period of indecision about the kind of secondary alternative that is acceptable. Eventually he gets into the unenviable position of being unable to compensate for the revenue loss brought about by an untimely territory. It is then likely that the next job vacancy he has is his own.

The best kind of respondents to recruitment advertising are often those who have not definitely decided to change their employment. Their attention was caught by an advertisement and they decided, perhaps on impulse, to discover more about the job in question. However, once they have attended an interview and discovered they are a commodity in demand, they can quickly get into the mood for changing jobs.

Any gap in the proceedings provides both the opportunity and incentive to seek alternatives.

#### Lost impetus

I have often seen the situation where candidates without any other job in mind have applied for a job, following an advertisement, and by the time they are invited to the third or fourth interview have managed to obtain firm offers of employment from competitive companies or even started a new job. Ridiculous, but true and recurrent.

Loss of impetus usually means loss of best applicants. Clearly, the number of interviews between the initial

meeting and the formal offer of employment has a significant bearing on the duration of the overall recruitment process. Practice varies considerably from one company to another, but in my opinion it should never take more than three meetings, involving two or more representatives of the employer, to reach a final decision.

A good way to hurry the proceedings along, while securing more than one opinion, is to have tandem interviews. This could involve two levels of sales management or the introduction of someone from the personnel department.

Which reminds me... A few weeks ago we had a candidate, calling for his third interview, but this still didn't get him beyond personnel and into the sales department. He declined the invitation — of course!

#### Wasted

A lot of time can be wasted on inadequate or unavailable people, whereas a campaign measured to the employer's precise requirements can include those actively seeking further employment, and those who are not actually job-hunters. After all, a successful salesman is likely to be actively involved in the job market.

One final point to sales managers who find it difficult to make time for recruitment interviews. There's always plenty of time before 9 am and after 5.30 pm. Many hardworking candidates would actually prefer it.

#### TRADER

### Puzzle Answer

THE sequence has been made up by expressing 13 in descending bases, starting with 10, the number of interviews between the initial



## CONTRACTS

C. £325 to  
£900 p.w.k.

IMMEDIATE to  
APRIL start

Midlands/H.C.	PDP11 RFXIM MACRO II	Programmers
London/Midlands	M 8800 or INTEL 8086	Programmers
London/H.C.	VAX or PDP11 RTL/2	Designers/Programmers
U.K.	IMS or DL/1 VSAM	Database Designers
U.K.	FINANCIAL	Analysts
U.K.	IMS DB/DC PL/1	Analysts/Programmers
U.K.	CICS, DL/1 CDBOL or TL/1	Analysts/Programmers
London/H.C.	IMS DB, ADF CDBOL	Snr. Programmer
London/H.C.	H66 FORTRAN or CDBOL	Programmers
London/North	SYS 34 or 2903 RPG II	Programmers
London	NCR NEAT II	Programmers
London/W. GERMANY	DS MVS	JCL Writers
London/W. GERMANY	MFT/MVS Conversion	Systems Programmers
London/H.C.	SERIES 1 RPS CDBOL	Programmers
London/H.C.	6100 DPPX CDBOL	Programmers
London	PRIME 300, CDBOL	Programmers
W. GERMANY	PL/M-PROCESS	Analysts/Programmers
W. GERMANY	CONTROL	Consultant
HOLLAND	DIGITAL TELECOMS	Software Engineers
	PDP11/VAX RTL/2	Analysts/Programmers

To register your interest phone JANET - 021-622 3040

### REAL TIME CONSULTANTS

Monaco House, Bristol Street  
Birmingham B5 7AS  
Telephone 021-622 6181 / 2 or 622 3040 (24 hrs)

## SHAPE TECHNICAL CENTRE THE HAGUE (HOLLAND)

SHAPE Technical Centre - a NATO Research  
Organisation - has a vacancy for a

## SENIOR SYSTEM PROGRAMMER

INITIAL SALARY DG.37,125  
NET PER ANNUM

for its Control Data Cyber 740 computer system. The successful candidate should have broad experience in data processing with at least three years in systems programming for a CDC Cyber/6000 computer system.

Good knowledge of programming in high-level languages and macro-assembler at the operating system level is required.

Starting salaries will depend on qualifications and experience and may be increased dependent on the family situation.

Applicants (NATO nationals only) should send a brief personal résumé to Personnel Officer, SHAPE Technical Centre, P.O. Box 174, 2501 CD The Hague, The Netherlands.

142071

## THE DEVELOPMENT OPPORTUNITY IN KENT FOR AMBITIOUS SYSTEMS PROGRAMMERS

Seismograph Service Ltd. are a major force in the seismic surveying field. Their operations are world wide and their computer utilisation ensures that they remain in the forefront of this dynamic area. As you will appreciate, it is an area of rapid end continuous growth and because of this, they need an ambitious systems programmer to join their professional team at BROMLEY.

You will have a science degree and at least 2 years' systems programming experience on DEC machines with a sound knowledge of ASSEMBLER. Preferably, you will have VAX operating systems experience and a wish to develop that experience on 11/780 equipment. You will be used to generating, maintaining and tuning systems and will be willing to give software support to the engineers on the ARRAY PROCESSOR.

You will want a career in the industry of the future and the following benefits:

- ★ A salary to £10,000
- ★ Subsidised canteen
- ★ Very attractive surroundings
- ★ Brand new offices
- ★ A superb training
- ★ A well-defined career path

Interested, then contact:

TUNBRIDGE WELLS 35712/3 (0892) (24-HOUR SERVICE)

141421



COMPUTANT  
LIMITED

RECRUITMENT AGENCY

14 MOUNT PLEASANT, TUNBRIDGE WELLS, KENT  
TELEPHONE TUNBRIDGE WELLS 35712/3/4

## IMS Systems Programmer

Amsterdam - 1 year £19,000+p.a.

**Initial posting**  
We are seeking a systems programmer with one or more years IMS experience. The initial assignment is to spend one year working as a member of a 3-man team in the Netherlands. The other team members consist of a senior systems programmer and a trainee, and the specific duties to be performed include generating and maintaining 1.1.1; planning for and implementing 1.2; providing advice and support to application development teams; and assisting in the evaluation of new DB/DC facilities and techniques. Our client's data centre runs MVS/SE and has a heavy IMS transaction load, with links to internal and external networks.

Inc. benefits

## IMS DB Support

Netherlands - 9 months+ £19,000+p.a.

**Initial posting**  
We are seeking an IMS specialist with a good understanding of IMS database design and familiarity with IMS utilities plus the technical aspects of DBA work. The initial assignment is to work for at least 9 months in the Netherlands, assisting in the implementation of IMS on a VME/370-130, using the IMS/VS/2.2.2. The successful candidate will also be responsible for the generation of DBD's, RPL's and other utilities, and will be involved in the design and technical support to application development groups.

CDS is a strong Anglo-Swiss consultancy specialising in providing Systems Programming, Database and Telecommunications support to European IBM users. The majority of our staff are employed by CDS in Zurich, but we are also prepared to offer long-term work in other parts of Europe.

For further details of these positions, please telephone or write to Jim Shaw at our UK Office, 01-252 2446, during business hours on 01-252 2446.

**The IBM System  
Software Specialists**

## PUT YOUR FUTURE IN THE LAP OF THE GODS!

ZEUS-HERMES RECRUITMENT LTD., provides a specialist recruitment service, finding suitable appointments for Data Processing Professionals for either permanent or contract positions.

Complete and return the coupon below, and...

-Don't just trust to luck!

Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Home Tel: \_\_\_\_\_ Work Tel: \_\_\_\_\_  
Present salary: \_\_\_\_\_ Salary sought: \_\_\_\_\_  
Present position: \_\_\_\_\_  
Position sought: \_\_\_\_\_  
Years in DP: \_\_\_\_\_  
Main Machine (s): \_\_\_\_\_ Main Language (s): \_\_\_\_\_



ZEUS-HERMES RECRUITMENT  
TELEPHONE: 01-388 6011 (24 HOUR SERVICE) OR WRITE  
(NO STAMP REQUIRED) ZEUS-HERMES RECRUITMENT LTD  
FREEPOST 20, LONDON W1E 4YZ

DEPARTMENT OF FINANCE

## COMPUTER SHIFT LEADER

Grade T3/4  
Salary £8,178-£8,537 plus 14% shift allowance  
The council currently operates an I.C.L. 1802T computer running under Geac 2+ with several on-line applications. A Honeywell 154/OPS.2 is due for delivery in 1981 as a replacement for the 1802T.  
The successful applicant will be expected to play a substantial role in the transfer of work from the present equipment to Honeywell installation and a knowledge of the D.C.O.S. operating system is desirable.  
Applicants must have at least two years' operating experience and be capable of accepting high levels of responsibility during the alternating shifts.  
Application forms available from the Chief Personnel Officer, Civic Centre, Millgate, Wigan, Tel. Wigan 44991, ext. 43.  
Closing date: January 23, 1981.

139711

Metropolitan  
Borough of **WIGAN**

POLYTECHNIC OF CENTRAL LONDON  
SCHOOL OF ENGINEERING AND SCIENCE  
The PCL has established itself as one of the leading institutions in computer education. The first year enrolments in Computing courses from HMO to HSC Courses are over 200 for the 1980/81 session. In addition there is a vigorous research program and active industrial collaboration. The Short Course programme attracts well in excess of 1,000 people a year on a variety of short courses.  
**PRINCIPAL LECTURER IN COMMERCIAL COMPUTING**  
SALARY: £11,800-£12,071 (BA9) - £14,000 inclusive of London Allowance.  
Currently there exists a vacancy for a Principal Lecturer in Commercial Computing. The successful candidate will be responsible for the leading of the commercially oriented courses, with lecturing, research and consultancy as appropriate. The areas of interest include:  
i) professional standards of programming for commercial applications in COBOL, PASCAL, etc.  
ii) systems technology for huge filing systems  
iii) micro computers applied to business  
iv) word processing.  
**LECTURER/SENIOR LECTURER IN DIGITAL SYSTEMS AND MICROCOMPUTER ENGINEERING**  
SALARY: £11,800-£12,071 (BA9) - £12,000 inclusive of London Allowance.  
Applications are invited from candidates with either a hardware or software background for a lectureship in Digital Electronics Systems to support the graduate and postgraduate computer technology teaching in the School of Engineering and Science. Research/consultancy and short course generation are all actively encouraged as constituent elements of the position. The successful applicant will be expected to make initiatives in at least one of these activities.  
Further information and application forms from the Establishment Office, The Polytechnic of Central London, 208 Regent Street, London, W1R 4AL.  
Closing date January 20th, 1981. Phone 01-580 2020 Ext. 212.

FOR  
CLASSIFIED  
ADVERTISING  
USE  
DIRECT LINE  
01-661 0121

## SAUDI ARABIA

We are seeking the following staff for bachelor status contracts:-  
**Analyst Programmers**  
With approximately 3 years experience of IBM computers Cobol and JCL. Also be able to design programs, program maintenance and develop systems facilities. (Ref. 62)  
**Operation Restart and Recovery Specialist**  
3 years experience in the restart of on-site production job failures and the operation of a master terminal for online telecommunications facility. (Ref. 5E)  
For application form ring Gordon Newton on 01-222 1677, or write to Laundstone (Middle East) Ltd., c/o Laundstone House, 36 Great Smith Street, Westminster, London SW1P 3BL.

## GUIDE TO RECRUITMENT CONSULTANTS IN THE U.K. LONDON & H. COUNTIES (LH), MIDLANDS (M), NORTH (N), SCOTLAND (S), OVERSEAS (O)

NORTHERN IRELAND

### ALL COMPUTER STAFF NEEDS

ESOC Management Consultants Ltd.  
Professional, reliable, confidential  
Write to: 77 Botolph Claydon, Suffolk  
S17 1JL, or phone 0492 54929

### Computer Professional Recruitment Consultancy

"COMPUTER PROFESSIONALS - MAKE  
SURE WE HAVE YOU IN MIND"

Head Office: 0832 77045  
Evening Session 040

### Ivor Norton Management Services Ltd

Recruitment Consulting Division  
82 Shaftesbury Avenue, London W1V 7QJ  
01-734 8992, 124 hour answering service  
P.O. Box 93, Shaftesbury House  
Regent 101 115, Tel: Regent 36628

### John Giddings Recruitment

01-229 1364  
Evening Session 040

### ALL COMPUTER STAFF NEEDS

ESOC MANAGEMENT CONSULTANTS LIMITED  
77 Botolph Claydon  
Suffolk S17 1JL  
Tel: Botolph 49088  
Professional, reliable, confidential

### FOR THE BEST PERMANENT AND CONTRACT STAFF THE NORTH, ENGLAND

01-229 1364  
Evening Session 040

### COMPUTER INDUSTRY SPECIALISTS

INSIGHT MARKETING & PERSONNEL CONSULTANTS LTD.  
AUSTIN HOUSE, CHARLOTTE STREET, MANCHESTER. TEL: 061-230 7029

### FOR FURTHER DETAILS OF THIS WEEKLY FEATURE CONTACT

OWEN KELLY, 061-872 8861